# FACT SHEET FOR STATE WASTE DISCHARGE PERMIT ST-5309

## Lamb-Weston Pasco

### SUMMARY

Process wastewater from Lamb-Weston's potato facility (French fries) has been land applied year around to sprayfields for final treatment since the 1960's. The amount of acreage has progressively increased from 36 to approximately 3100 acres. All new acreages have historically been used for general irrigated crop production. Water and nitrogen loads on a small area exceeded crop requirements for approximately 20 years before the expansion of the sprayfield system. Current loads have generally been below the design treatment capacity for these parameters. Salt loads have exceeded crop requirements.

Ground water data from the extensive monitoring well system shows that nitrate and TDS concentrations beneath the sprayfield site generally exceed the ground water criteria. The background ground water quality for selected sub-areas of the site exceeds the criteria for nitrate and TDS.

Early warning values in the vadose zone, instead of enforcement limits in the downgradient ground water, have been selected as the method for evaluating the treatment capacity of the year around land treatment system and its ability to protect background ground water quality. The ability to protect background quality will be evaluated on the trend in the vadose test results relative to the early warning value.

Performance standards for the sprayfields have been added to the permit based on design information provided by Lamb-Weston.

A compliance schedule has been added to require that all available sprayfield acreage be brought on-line and in use by April 1, 2006.

**(NOTE: See Response to Comments for changes)**

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## INTRODUCTION

This fact sheet is a companion document to the draft State Waste Discharge Permit No. **ST-5309** . The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of wastewater to waters of the State of Washington. This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the state include procedures for issuing permits (Chapter 173-216 WAC), and water quality criteria for ground waters (Chapter 173-200 WAC). They also establish requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

| GENERAL INFORMATION | |
|---|---|
| Applicant | Lamb-Weston, Inc. |
| Facility Name and Address | Lamb-Weston, Pasco<br>P.O. Box 2324<br>Pasco, WA 99302 |
| Type of Facility | Processor of frozen potato products; french fries. |
| Type of Treatment: | Land treatment via center-pivot spray irrigation |
| Discharge Location | Process facility:<br>Latitude: 46° 17' 17" N Longitude: 119° 06' 48" W. |
| Legal Description of Application Area | Approximately 3130 acres located in: Sections 1,3,12,13, T.9N, R. 29E; Sections 13,24,25,26,35, T. 10N, R. 29E; Sections 6,7, T. 9N, R. 30E; portions of Gov't Lot 6&7 lying W. of BNRR right-of-way.<br><br>Latitude: 46° 17' 23" N. Longitude: 119° 07' 04" W. |
| Contact at Facility | Name: Cliff Stevens, Engineering Mngr.<br>Telephone #: 509-547-8851 (ext. 68700) |
| Responsible Official | Name: Rick Martin, Director Operations |

| GENERAL INFORMATION | |
|---|---|
| | Telephone #: 509-547-8851<br>FAX # 509-545-8203 |

## BACKGROUND INFORMATION

### *DESCRIPTION OF THE FACILITY*

#### HISTORY

The Lamb-Weston (L-W) potato processing facility began operations under different ownership in the late 1960's. Process wastewater was initially spray irrigated onto a nearby 36 acre site. Additional fields were added in 1970 that increased the land treatment area to 286 acres. Spray irrigation of the wastewater continued on these fields until 1990. L-W purchased the facility in 1994 and continued a program to expand the land treatment area. Currently, there is approximately 3100 acres of sprayfields available for use in L-W's land treatment system; 2500 acres are currently plumbed for wastewater use. Most of the land is under long-term lease agreements with the owners. The spray irrigation of wastewater to the fields has and continues to be year around.

#### INDUSTRIAL PROCESSES

The L-W Pasco facility produces frozen potato products (French fries) year around using freshly harvested and stored potatoes depending upon the time of year. According to information presented in the application, approximately 700-1200 tons/day of potatoes are processed to produce 400-800 tons/day of product.

Generally, the process consists of washing the raw potato to remove dirt, steam and scrubbers to remove the peel, preheating, cutting, blanching, drying, frying, freezing, and packaging. A continuous water stream carries the potato through most of the process from dirt removal through the cutting stage.

Process wastewater is collected in a floor trench system and sent through several solids removal processes including screening, clarifying, and sludge removal. Water from the clarifier gravity flows approximately ¼ mile to the sprayfield pump house where its pumped to the different sprayfields that comprise the land treatment system (Figure 1). If necessary, supplemental water can be blended with the wastewater at the pump house from a freshwater supply well. Wastewater can also be pumped undiluted.

Located next to the sprayfield pump house is a lined 19 MG surge/mix basin which is generally used to store supplemental fresh water. Wastewater can also be directed to the basin during periods of short-term inclement weather.

#### LAND TREATMENT SYSTEM

Year around spray irrigation of process wastewater for final treatment has been used at this processing facility since 1967. The current system is comprised mostly of center pivot fields that are under extended use agreements between L-W and the land's owners (Figure 1). Prior to their use by Lamb-Weston for wastewater treatment, most all of the fields were operated to grow various cash crops using general sprayfield agricultural practices.

Prior to 1990, Fields LW9-11 (289 acres) were the only fields used for wastewater treatment. Since then, the available sprayfield acreage has progressively grown to its present size of approximately 3130 acres. Fields A1-5, and LW6-8 were added in 1990, and the J8-10 and G-fields were added in 1994. The J11-15 fields were added in 1998 and the R-fields in 2000.

Process wastewater is pumped to the center-pivot system from the main irrigation pump station located near the surge basin (Figure 1). Booster pumps help maintain flow pressures. Supplemental water can be blended at the irrigation pump station from a L-W owned supply well. Supplemental irrigation water (no blending) is also available from wells located at specific fields.

The design of the land treatment system is presented in an Engineering Report (CES, 2001). The nutrient and hydraulic capacities for the site were based, in part, on the agronomic rates for crops over a twelve (12) year crop rotation schedule. Design values include:

| | |
|---|---|
| Available sprayfield acreage: | 3119 Acres |
| Average monthly flow: | 2.2 MGD |
| Total annual flow: | 803 MG |
| Annual net N load from processing facility: | 534,093 lbs |
| Annual COD load from facility: | $15.4 \times 10^6$ lbs (14 lbs/ac/day) |
| Annual TDIS load from facility: | $12.22 \times 10^6$ lbs |

The report determined that nitrogen is not a design limiting parameter for the land treatment system. Nitrogen uptake capacities for the 12 year crop rotation ranged from 902,600 to $1.076 \times 10^6$ lbs/year, which are well above the design annual nitrogen load of 534,093 lbs. The hydraulic load capacity to meet the crop's water requirement ranged from 3251 to 3385 million gallons per year depending on the crop. These values are well above the total annual flow from the processing facility (803 MG) and reflect the need for supplemental irrigation water to meet the crop demand.

The report did conclude that hydraulic loading and its relationship to the leaching requirement (LR) to manage salts in the root zone is the design limiting factor for the land treatment system.

Site Operation and Performance

Annual Irrigation and Crop Management Plans (1999-2002) were reviewed to evaluate the operation of the system relative to its design.

Hydraulic Load:

| Year | Gross Wastewater | | Crop Use |
|---|---|---|---|
| | Gallons | inches/acre | inches/acre |
| 1999 | $597 \times 10^6$ | 9.9 | 46.4 |
| 2000 | $538 \times 10^6$ | 8.6 | 33 |
| 2001 | $579 \times 10^6$ | 8.4 | 30 |
| 2002 | $606.5 \times 10^6$ | 9.0 | 33.7 |

The difference between the gross wastewater applied (in/acre) and the crop use was made up by supplying supplemental water to the crops.

The total annual gross wastewater hydraulic load values have been well below the design value of 803 MG and hydraulic load values have been well below the crop requirements. Taking into consideration evaporative losses and irrigation efficiency, "net" wastewater loads are considerably lower than the design value. Supplemental irrigation water was required each year to meet the crop's water demand.

Nitrogen loading:

| Year | Total net N load | | Crop Use | |
|---|---|---|---|---|
| | Pounds | lbs/acre | Pounds | lbs/acre |
| 1999 | 619,100 | 350 | 773,900 | 438 |
| 2000 | 612,800 | 270 | 899,000 | 390 |
| 2001 | 905,700 | 365 | 781,200 | 315 |
| 2002 | 797,000 | 321 | 841,000 | 339 |

Except for year 2001, the total net N load to the sprayfields (wastewater + supplemental water + commercial fertilizer) was less than the crop uptake. No explanation was given in the 2001 Irrigation and Crop plan for the higher N loads. When the nitrogen contributions from the supplemental water and fertilizer is taken away from the total net N load values, the contribution of nitrogen to the sprayfields from the wastewater was well below the design value of 534,093 lbs/yr from the processing facility.

Total dissolved inorganic solids loading:

| Year | Total TDIS load | Crop Use |
|---|---|---|
| | Lbs/acre | Lbs/acre |
| 1999 | 5317 | 660 |
| 2000 | 3382 | 539 |

| | | |
|---|---|---|
| 2001 | 2881 | 660 |
| 2002 | 3100 | 650 |

Total dissolved inorganic solids loading to the sprayfields has exceeded the crop demand for each year. This is not uncommon for all of irrigated agriculture including vegetable and potato processors who use land treatment systems. Providing a sufficient amount of land to "treat" the salt loads from these facilities is generally cost prohibitive. Instead, a salt management approach is used which consists of identifying and implementing Best Management Practices and Pollution Prevention measures in the processing facility to reduce inorganic salt production and discharge, and to apply excess water to the fields to leach accumulated salts from the root zone; e.g., leaching requirement. The goal is to maintain a soil salinity of <2 mmhos/cm for this site.

A significant part of the total TDIS load to the sprayfields is from the supplemental irrigation water. Correspondence from L-W on the 2002 Irrigation and Crop Plan shows that the TDIS load from the supplemental water was 3700 lbs/ac and the TDIS load from the wastewater was 3058 lbs/acre. The large salt contribution from the supplemental water is due primarily to the large amount of this water needed to meet the crop demand.

Year Around Application

The sprayfield engineering report (CES, 2001) evaluated the need to eliminate the practice of applying wastewater to the land treatment system year around and provide storage during the non-growing season winter months to protect the ground water. Water balances were constructed for each of the 12 crop rotation years with year around application of wastewater. The water balance calculations were based on assumed values for many different parameters, including: the 1-in-10 year precipitation for the Nov. – Feb. period; average monthly wastewater flow of 2.2 MGD; 3119 acres; maintain root zone salinity $\leq$ 2 mmhos/cm.

"Leaching fraction" (LF) values for each of the 12 years were then determined for the entire land treatment site and compared to agronomic "leaching requirement" (LR) values for each year. The LR values represent the excess amount of water applied to the sprayfields that is necessary to control the soil salinity and maintain good crop growth. The results showed that the LF value for each crop year was less than its respective LR value. The amount of water leached from the root zone during each of the crop years from year around application was less than the agronomic requirement to control soil salinity.

From this information, the report concluded that winter storage is not necessary, and that year around application of wastewater is protective of the site's ground water and is AKART for this site.

In response to Ecology comments, L-W submitted an addendum to the engineering report that, in part, attempted to perform a risk analysis to determine if the risk to impact the ground water for year around application is the same as that from providing winter storage during the non-growing season (CES, 2003).

A model was used to predict the amount of nitrate-N loss in the percolate from the root zone for the scenarios of year around application (current system) and application with winter (Nov-Feb) storage. The water budgets for the 12 year crop rotation described in the engineering report were

used. Several statistical tools were used to compare the estimated nitrate-N loss values. The report concluded "...that well-managed year-round land application is equal to well-managed land application with storage in winter in terms of potential for leaching soil nitrate to groundwater." Year-round application is AKART for the Lamb-Weston Pasco facility.

*GROUND WATER*

The sprayfields are composed of deep, well drained to excessively drained soils of silts and fine sands with low (0.1 – 0.4%) organic matter. The upper unconfined aquifer is in coarse textured alluvium overlying basalt bedrock. Most or all of the irrigation production wells are completed in the unconfined aquifer beneath the site. All of the 30 monitoring wells (Figure 1) for the land treatment site are completed in this upper unconfined aquifer.

Information contained in the hydrogeologic study of the site (CES, 2000) and in the addendum to the engineering report (CES, 2003) shows that ground water flow follows the topography of the site. A three-sided bowl is created by higher land elevations in the west, north, and east, and lower elevations in the south towards the Columbia River; ground water flow is to the south (Figure 2).

The depth to ground water is shallowest in the north (7ft bgs) and deepest in the south (165ft bgs). The ground water fluctuates 2-6ft with the shallowest levels in Feb/Mar and deepest levels in Aug/Sept. The ground water gradient is relatively steep in the northern part of the site (0.023 ft/ft) and considerably flattens out in the southern area (0.006 ft/ft).

The 2000 HG report used a numerical model to estimate solute transport through the vadose zone. Based on a depth to ground water of 50ft and an annual percolate loss of 8.5 in/ac, it was estimated to take in excess of 6.63 years for nitrate in the soil root zone percolate to measurably affect ground water under the current operation of year-round application.

Up- and Downgradient Wells

The most recent interpretation of the ground water elevations at the site (CES, 2003) show the following as upgradient wells representing background ground water conditions at the land treatment site (Figure 1):

| | Upgradient | Downgradient |
|---|---|---|
| G-fields | MW-10S, MW-11, and MW-12S | MW-14 and MW-15 |
| R-fields (R26, RR) | MW-13S | MW-14 and MW-15 |
| J-Fields (J8-10) | MW-13S | MW-16 |
| Section 3 J-Fields (J11-15) | MW-26 and MW-27 | MW-24 and MW-17 |
| L-W fields (except LW-8) and A-5 | MW-1 and MW-2 | MW-4, MW-5, MW-6, and MW-19 |
| LW-8 and A-fields (except A-5) | MW-7 | MW-8, and MW-20, MW-21, MW-22, MW-23 |

The Permittee cautioned the comparison of some up- and downgradient wells because of the difference in the placement of the well screens at each well in relation to the ground water surface (CES, 2003). Some wells are screened several feet below the ground water surface while others are screened at the ground water surface. For wells that were placed in close proximity to one another (nested), it was found that ground water quality improves with screen depth.

Additionally, some of the fields have received limited amounts of wastewater or have been on-line for a limited amount of time. The G-fields and the J-fields (J-8 to J-10) have received wastewater year around for about 8 seasons. The R-fields and J11-J15 fields have received wastewater for the past three and four years, respectively. This information is important when considering comparing up- and downgradient well values because of the estimated >6.63 years for percolate loss from the root zone to reach the ground water.

Ground Water Quality

Monthly DMR (Discharge Monitoring Report) data for the period April 1999 – September 2003 was summarized and evaluated. For discussion purposes, the site was divided into four areas: the northern G-, R-, and J-fields; section 3 J-fields; L-W fields; and, A-fields; Fig. 1.

**G-, R-, and J-fields**:

Ground water beneath this area of the site is monitored by downgradient wells MW-10 to MW-15. Figure 3 and 4 present the nitrate and total dissolved solids (TDS) data for these wells for the reporting period. Nitrate values for MW11 and 13 have been below the ground water criteria of 10 mg/L; Fig. 3. The seasonality in the values at MW-13 may be due to its proximity to an irrigation diversion canal. Values at MW-12 have tended to be always near (above and below) the criteria. Nitrate values at MW10, 14 and 15 were generally always higher than the criteria. Average values for these three wells were 12.1, 13.7, and 17.5 mg/L, respectively.

The TDS ground water quality beneath these fields generally "hover" around the ground water criteria; Fig. 4. The highest values occurred at MW-15, which had an average value of 538 mg/L.

**Section 3 J-fields**:

Ground water beneath this area of the site is monitored by downgradient wells MW-24 to MW-27. Nitrate values beneath this site generally exceeded the ground water criteria for the entire reporting period (Figure 5); the only exception was at MW-27. The highest values appeared to occur at MW-25, and values at MW-24 to MW-26 appear to show an increasing trend. Nitrate values at MW-27 have generally been less than the ground water criteria, with an average value of 7 mg/L.

Similar results were found for TDS values where all values at MW-24 to MW-26 have been above the ground water criteria value, while values at MW-27 were less than the criteria; Figure 6.

**L-W fields (except field LW-8)**:

Figures 7 and 8 present the nitrate and TDS data for the downgradient wells that monitor the ground water beneath these fields. Most of these fields have received wastewater since the potato

facility came on-line in the mid-60's. All wells show nitrate values beneath this area of the sprayfield site have been continuously greater than the ground water criteria of 10 mg/L; Fig. 7. The highest values were found at MW-6 where the average concentration is 29.3 mg/L.

Similarly, TDS values at all of the wells have been above the ground water criteria; Fig. 8. The highest values were also at MW-6 with an average concentration of 773 mg/L.

**A-fields and field LW-8**:

These fields have received wastewater year around since 1990. Nitrate concentrations in the ground water beneath this site have also generally been above the criteria with the highest concentrations at MW-22 and MW-23; Figure 9. Average values at these wells are 25.3 and 25.2 mg/L, respectively. Nitrate concentrations are lowest at MW-8 with an average concentration of 10.8 mg/L. The 2003 engineering report noted that the low nitrate values at MW-8 are most likely because the well screen is located deeper into the aquifer rather than near the surface at the other wells.

Total dissolved solids concentrations in the ground water beneath the site have also been greater than the criteria value, even at MW-8; Figure 10. There are no apparent trends at any of the wells. The highest values were generally found at MW-9

*PERMIT STATUS*

The previous permit for this facility was issued on April 28, 1999 and expires on June 1, 2004. The permit was amended in July 2000 to add 960 acres to the sprayfield system, and again in May 2003 to add ground water testing at the section 3 J-fields.

An application for permit renewal was submitted to the Department on December 1, 2003 and accepted by the Department on December 9, 2003.

*SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT*

The facility last received a compliance inspection on January 22, 2004 and was found to be in compliance with the conditions and limitations in the permit.

During the history of the previous permit, the Permittee has remained in compliance based on Discharge Monitoring Reports (DMRs) and other reports submitted to the Department and inspections conducted by the Department.

*WASTEWATER CHARACTERIZATION*

The concentration of pollutants in the discharge was reported in the permit application and in discharge monitoring reports. The proposed wastewater discharge prior to land application is characterized for the following parameters as presented in the permit application:

**Table 1: Wastewater Characterization**

| Parameter | Concentration |
|---|---|
| COD | Range: 1160-3530 mg/L; avg = 1948 mg/L |
| TDS | Range: 1229-1843 mg/L; avg = 1501 mg/L |
| $NH_3$-N | Range: 18.1-68.3 mg/L; avg = 40 mg/L |
| pH | Range: 5.6 - 6.9 s.u. |
| TKN (as N) | Range: 55.4-138 mg/L; avg = 88 mg/L |

Organic and ammonia are the principal nitrogen forms in the wastewater; there is essentially no nitrate present. This is typical for wastewaters discharged from potato processing facilities. Data submitted in DMRs shows that potassium and sodium are the principal cations in the wastewater, and bicarbonate and chloride the principal anions. The total dissolved inorganic solids concentration of the wastewater ranges from about 600 to 2200 mg/L.

The average monthly flow from the processing facility ranged between 0.704 to 2.04 MGD for the April 1999 – September 2003 time period.

## PROPOSED PERMIT LIMITATIONS

All Known Available and Reasonable Methods of Treatment

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using all known, available, and reasonable treatment (AKART) and not pollute the waters of the State. Lamb-Weston has submitted an engineering report that describes the design capacities of the sprayfield system (CES, 2001). It concluded that "hydraulic loading and particularly salts management have been identified....as the design limiting factor" for the sprayfield site. The amount of water leached from the root zone at the site under the current year around application scenario (leaching fraction; LF) does not exceed the agronomic leaching requirement (LR) to control soil salinity. Therefore, the report concluded that the large amount of available acreage, and the associated crop and irrigation management of the system can protect the ground water beneath the site and is AKART for this site. Winter storage of the wastewater during the non-growing season is not needed.

In response to Ecology comments on the engineering report, an addendum to the report was submitted that, in part, performed a risk analysis that compared the potential to impact ground water from two irrigation scenarios: irrigating wastewater year around (current system), and irrigate only during the growing season with winter storage (CES, 2003). Water balance modeling of the sprayfield site was used to estimate the amount of nitrogen lost from the root zone and potentially to the ground water. The report concluded that the results of the risk analyses supports L-W's position that year around application of wastewater provides the same level of protection of the ground water as winter storage and is AKART for the site; winter storage of the wastewater is not necessary.

The operation of a land treatment system without providing winter storage during the non-growing season is contrary to what Ecology has approved as AKART for most all land treatment systems. Approval has been given for the application of water and nutrients at agronomic rates during the growing season, with lined storage of the wastewater during the winter non-growing season when crop uptake (i.e., treatment) is minimal. It is believed and there is evidence to support that the low level of treatment during the non-growing season by the crops and associated soil microbes during the colder winter temperatures, and the uncertainty associated with nitrogen dynamics in the soil column increase the potential of applied wastewater pollutants (primarily nitrogen and dissolved salts) to be leached through the root zone by winter precipitation and into the ground water (Ecology, 2000)

Ecology is considering guidance for land treatment systems that will further help define AKART for land treatment systems where the facility discharges year around or produces wastewater in excess of the crop requirements. Until this is finalized, AKART for land treatment systems will be evaluated on a case by case basis.

After reviewing the design, modeling, and statistical analysis of the data that have been submitted by L-W that defines the continued year around application of wastewater to the sprayfields as AKART for their site, Ecology is not convinced that applying wastewater year around to the sprayfield system provides the same level of protection to the ground water as does restricting the application of wastewater during the growing season and providing storage during the winter months, and has therefore, not approved either of the engineering reports. This is based, in part, on:

1. The acceptance of the statistical analyses used by L-W (CES, 2003) in their risk analysis comparing the impact to the ground water from the current system of applying wastewater year around, and from restricting application of wastewater to the growing season and storing the water in a lined impoundment during the non-growing season.

2. The acceptance of the water balance model for the sprayfield site (CES, 2001) that was used to estimate the loss of nitrates from the soil column to the ground water for both irrigation scenarios.

3. The uncertainty in the level of control L-W has over the complete operation (e.g., supplemental water and fertilizer additions) of the sprayfields under lease agreements with the land owner.

4. The absence of a cost analysis by L-W to determine "reasonableness" of the different "all known and available" treatment alternatives that were evaluated for the site in their definition of AKART.

5. Information published in an extensive literature review of the land application of wastewaters and the dynamics of nitrogen in the soil column (Ecology, 2000), and Ecology's experience with land treatment systems and their impacts to ground water.

Instead of accepting or rejecting the AKART analysis submitted by L-W, Ecology proposes to: 1) Allow the continuation of the current land treatment system, but to condition the permit with "performance standards". These will be based on information presented in the engineering reports for the sprayfield site, and on L-W's recommended monitoring plan for the sprayfield site

(CES, 2000); and, 2) Require compliance with the ground water standards in selected areas of the site that have been used the longest for year around application of wastewater.

It is believed that this decision acknowledges the technical analyses and design information presented by L-W that may define AKART for their site, and Ecology's uncertainty with L-W's AKART determination and its experience with land treatment systems and ground water protection during the non-growing season. It allows for an opportunity to operate the sprayfield system as designed, and to collect data to "ground truth" the irrigation management and crop plan and modeling that were used in the AKART analysis. At the same time the permit will require compliance with the ground water standards for the ground water beneath the portion of the site that has received wastewater for the longest period of time.

*TECHNOLOGY-BASED EFFLUENT LIMITATIONS AND PERFORMANCE STANDARDS*

All waste discharge permits issued by the Department must specify conditions requiring available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110). The following permit limitations and performance standards are necessary to satisfy the requirement for AKART and were taken, in part, from the engineering report and its addendum (CES, 2001; CES, 2003):

1. Wastewater shall be land applied via spray irrigation not to exceed agronomic rates (as defined in the Department's ground water implementation guidance) for total nitrogen and water, and at rates for other wastewater constituents that are protective of background ground water quality.

2. Total nitrogen and water shall be applied to the sprayfields as determined by a current irrigation and crop plan.

3. The system must be operated so as to protect the existing and future beneficial uses of the ground water and not cause a violation of the ground water standards.

4. The sprayfield system will be expanded to its full 3119 acres and brought on-line for wastewater application by April 1, 2006. (**NOTE**: please see Response to Comments for changes)

5. The leaching fraction (LF) for the sprayfield site shall not exceed 11.2%. This value represents the average leaching requirement (LR) to control soil salinity for the entire sprayfield site, for the 12-year design crop rotation scenario.

6. Leaching will be done when necessary and only during the late winter (February). The leaching requirement shall be met using precipitation and fresh water (not mixed with any wastewater). (**NOTE**: please see Response to Comments for changes)

7. The net total nitrogen load to the sprayfield site shall not exceed 900,000 lbs/year. This represents the lowest "nitrogen capacity" of the sprayfield site for the 12-year design crop rotation. (**NOTE**: please see Response to Comments for changes)

8. The average flow for the maximum month from the processing facility shall not exceed 2.2 MGD.

9. The application of supplemental irrigation water to any field shall not exceed 8.5 inches per month whenever process wastewater is applied in the same month. (**NOTE**: please see Response to Comments for changes)

10. Maintain a stable or declining end-of-cropping-year soil profile nitrate concentration trend, at the 5-foot depth, over a continuously progressive three year period for each sprayfield. (**NOTE**: please see Response to Comments for changes)

Compliance with these performance standards shall be determined based on information presented in the annual Irrigation and Crop Management Plan. The plan will be required to show compliance with each of these standards.

*GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS*

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. The goal of the ground water quality standards is to maintain the highest quality of the State's ground waters and to protect existing and future beneficial uses of the ground water through the reduction or elimination of the discharge of contaminants to ground water [WAC 173-200-010(4)]. This goal is achieved by [GW Implementation Guidance, Abstract, page x]:

1. Requiring that AKART (all known available and reasonable methods of prevention, control and treatment) be applied to any discharge;

2. Application of the antidegradation policy of the ground water quality standards. This policy mandates protecting background water quality and preventing degradation of water quality which would harm a beneficial use or violate the ground water standards; and

3. Establishing numeric and narrative criteria for the protection of human health and welfare in the ground water quality standards.

Numeric ground water criteria (maximum contaminate concentrations) are based on drinking water quality criteria. Applicable criteria concentrations are listed below:

**Table 2: Ground Water Quality Criteria**

| | |
|---|---|
| Total Dissolved Solids | 500 mg/L |
| Nitrate | 10 mg/L |
| pH | 6.5 to 8.5 standard units |

The intent of the ground water quality standards is to protect background water quality to the extent practical, rather than to allow degradation of ground water quality to the criteria. The procedures for estimating background water quality are contained in the Guidance Document for

Implementing the Ground Water Standards (Ecology, 1996). Background water quality is defined as the 95 percent upper tolerance interval with a 95 percent confidence.

BACKGROUND WATER QUALITY

Information presented in the engineering report (CES, 2001) on the history of the sprayfield site and the progressive expansion of the available acres for wastewater application shows that the LW- and A-fields have been used for the longest period of time. All have received wastewater year around well in excess of the time it has been estimated for water to percolate through the soils and into the ground water; 6.63 years.

These sub-areas of the sprayfield site shall comply with the ground water standards.

LW- fields (except LW-8) and field A-5

Data from MW-1 and MW-2 (April 1999 – Sept. 2003) was used to determine the background ground water quality for nitrate and TDS for this sub-area of the sprayfield site. Outlier, seasonality, and trend analyses were performed on the data. A parametric ANOVA (Analysis of Variance) test of the data from both wells showed no significant variation in the means at the 5% level for the nitrate and TDS data; Appendix C. Therefore, an interwell upper tolerance level (background) was determined for both parameters which combines the data from both wells (Appendix C):

Nitrate = 20.5 mg/L
TDS = 600 mg/L

Figure 11 and 12 compare the background values to monthly values at the down gradient wells (MW-3, 4, 5, 6, and 19) for the period April '99 – September '03. The highest nitrate values and greatest exceedance of the background value occurred at MW-6 which is located adjacent to the LW-9 field (Fig. 1) which has received wastewater since 1967. Nitrate values at the other wells varied above and below the background value.

A similar comparison was found for TDS. Values found at MW-6 exceeded the background most of the time, while values at the other downgradient wells varied above and below the background.

LW-8 and A-fields (except A-5)

Data from MW-7 (April 1999 – Sept. 2003) was used to determine the background ground water quality for this sub-area of the sprayfield site. Outlier, seasonality, and trend analyses were performed on the data. Intra-well upper tolerance levels (background) were determined (Appendix C):

Nitrate = 24.3 mg/L
TDS = 657 mg/L

Figure 13 and 14 compare the background values to monthly values at the down gradient wells; MW-8 and MW-20-23. Values at MW-8, -20, and -21 were generally below the background value for nitrate. Monthly values higher than the background value occurred consistently at MW-22 and -23.

TDS values in the downgradient wells followed the same general pattern for nitrate. Values at MW-8 were generally below the background value, while the other wells showed values near or above the background.

ENFORCEMENT LIMIT

To protect existing ground water quality and to prevent ground water pollution, the ground water standards provide for the establishment of enforcement limits. Enforcement limits are determined on a case-by-case basis and are generally established at levels less than the ground water criteria. These limits represent the maximum allowable concentration of a particular substance which can be detected at a specified point of compliance. However, whenever the background water quality is greater than the criteria value, then:

Enforcement Limit = Background water quality

This is the case for the two Lamb-Weston sprayfield sub-areas described above. The enforcement limits for nitrate and TDS would be:

LW- fields (except LW-8) and field A-5

Nitrate = 20.5 mg/L
TDS = 600 mg/L

LW-8 and A-fields (except A-5)

Nitrate = 24.3 mg/L
TDS = 657 mg/L

POINT OF COMPLIANCE

The point of compliance with ground water enforcement limits is determined on a site specific basis and is in the ground water "...as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible."(WAC 173-200-060(1). Ecology's ground water guidance defines a violation of an enforcement limit as two consecutive exceedances for the same parameter at the same well.

Based on the data from the downgradient wells for the two irrigation sub-areas (Figs. 11-14), the Lamb Weston facility would have been in violation of the nitrate and TDS enforcement limits had these limits been in place during the current permit cycle. Issuing a permit with the proposed enforcement limits would most likely cause Lamb-Weston to be in near-immediate non-compliance with the limits.

The ground water criteria allow for "alternate points of compliance" (APC) that are established in the ground water, but are located at some distance from the source, but not exceeding the property boundary. APC take into consideration the fate and transport of contaminants in the saturated zone where immediate compliance is not feasible. Currently, there are is no established location in the ground water that could be considered an APC for either irrigation sub-area.

The ground water criteria also provide for the establishment of "early warning values"; EWV. The purpose of these values is to provide early detection of increasing contaminant concentrations that may approach or exceed an enforcement limit. It is a tool for protecting the ground water from further degradation by alerting the discharger and regulatory agency that concentrations are increasing.

Early warning values can be established in a variety of locations, including the effluent, ground water, or vadose zone. An exceedance of an early warning value (EWV) is not considered a violation of the water quality standards, unless there is an exceedance of an enforcement limit and there is a failure to notify Ecology as required in WAC 173-200-070(6).

Recognizing that: 1) it takes approximately 6.6 years for water and contaminants to percolate vertically through the soil column and into the ground water at the L-W sprayfield site; and, 2) the horizontal time of travel in the ground water beneath these sub-areas could be a very long given the ground water gradient (15 ft/yr) and the distance between up- and downgradient wells (hundreds of feet), a decision was made to establish EWV's in the vadose zone, at the bottom of the root zone (60" below ground surface), beneath both sprayfield sub-areas.

Instead of using EWV's as an indicator to exceed an enforcement limit, they will allow for a more timely determination of whether or not the implementation of the technology-based performance standards for the year-around land application site can provide a level of treatment that is protective of the background ground water quality. Soil percolate data collected from the vadose zone, that consistently can not achieve or be less that an EWV, would act as a trigger to show that operations of the sprayfield may not be in a manner that is protective of the ground water, and that changes are needed.

The vadose zone sampling requirements associated with the EWV's will also allow for the collection of information, such as percolate nitrate and TDS values, and leaching fraction values that can be used to compare (ground truth) with values used by Lamb-Weston in their risk analysis model (CES, 2003).

Ecology's ground water guidance shows EWV's are established halfway between the background water quality and the enforcement limit:

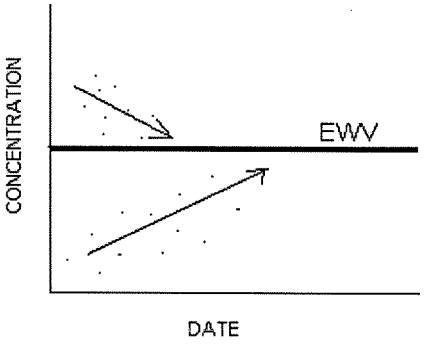
$$EWV = \frac{Background\ water\ quality + Enforcement\ Limit}{2}$$

For the two sprayfield sub-areas of the Lamb-Weston site, background and enforcement limits are the same for nitrate and TDS, therefore:

EWV = Background water quality

It is recognized that soil water data collected from vadose zone sampling can be quite variable given the differences within and between sampling methods, their installation, the soil type, etc. However, a method of determining whether the EWV's can be/are being met, or will be exceeded is needed to determine if the performance of the sprayfields can be protective of the ground water.

Lamb-Weston will be required to evaluate the trends in nitrate-N and TDS at each sub-area relative to the EWV's. Short-term (1 year) and long-term (3 years) trends will be reported in the annual Irrigation and Crop Management Plan.




An increasing trend can be interpreted to mean that the year around application of wastewater on the sprayfields is not providing a sufficient level of treatment that will result in achieving the EWV, and the ability to comply with the enforcement limit and protect the ground water beneath the site.

According to WAC 173-200-070(6)(b), Ecology can take a variety of actions, including "..actions the department deems necessary, if the department determines that there is a likelihood of exceeding an enforcement limit at the point of compliance." Actions include the issuance of an administrative order for the construction of a lined winter storage impoundment, implement a higher level of pretreatment before land application, and/or additional sprayfield acreage.

*COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED APRIL 28, 1999*

**Table 3: Comparison of Previous and New Limits**

| Parameter | Existing Limits | Proposed Limits |
|---|---|---|
| Maximum average monthly flow from processing facility | 2.2 MGD | 2.2 MGD |
| Daily maximum flow from processing facility | 2.7 MGD | 2.7 MGD |
| Technology-Based Limitations/Performance Standards for the sprayfield system | None | See page 15 |
| | | Early Warning Values in the Vadose Zone |
| LW-fields (except LW-8) and field A-5 | None | |
| Nitrate-N | | 20.5 mg/L |
| TDS | | 600 mg/L |
| LW-8 and A-fields (except A-5) | None | |
| Nitrate-N | | 24.3 mg/L |
| TDS | | 657 mg/L |

## MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, that ground water criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110).

*WASTEWATER MONITORING*

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

The testing schedule and parameter list in the current permit for the clarifier effluent and irrigated process wastewater (effluent + supplemental irrigation water) will remain essentially unchanged. The only change will be to reduce the monitoring frequency of COD testing from "1/month" to "4/year"

*CROP MONITORING*

The monitoring requirements for the sprayfield crops in the current permit will be extended into the proposed permit. The results of the monitoring will be reported in the annual Irrigation and Crop Management Plan.

The current permit requires composite samples be collected from each center pivot field. Samples shall be comprised of at least ten (10) random samples from each harvest. The Department has determined that this is a reasonable request for crops such as alfalfa, grass, wheat, mint, and related types for the determination of nutrient uptake and developing nutrient balances.

For crops that are less "grain/grass" type (i.e., non-forage crops) and have a large amount of vegetative growth (e.g., corn, potatoes), the use of a single and established literature value for nutrient uptake for the determination of nutrient uptake, and developing nutrient balances is acceptable.

*SOIL MONITORING*

The soil monitoring schedule and parameter list in the current permit will be extended into the proposed permit. The results of the monitoring will be reported in the annual Irrigation and Crop Management Plan.

In order to demonstrate compliance with the performance standard of maintaining a stable or declining end-of-cropping-year soil profile nitrate concentration trend at the 5-foot depth over a continuous three year period, the reporting of soil data for nitrate will be graphically presented in the annual I/C Plan.

*VADOSE ZONE MONITORING*

The permit will require the Permittee to submit a plan for the installation of a vadose zone monitoring system for the sprayfields within the "LW- fields (except LW-8) and field A-5" and

"LW-8 and A-fields (except A-5)" sub-areas. The system will be designed to collect soil water from the bottom of the root zone; 60" bgs.

The plan will include a description of the O&M for the system that includes sample collection and preservation. A testing schedule shall also be developed that includes the determination of "percent root zone soil nitrate loss" and the amount of water leached. These values can be compared to the percent loss values determined by L-W's risk analysis, and the estimated leaching fractions for the various crop rotations used by L-W in their AKART analysis.

*GROUND WATER MONITORING*

The monitoring of ground water at the site is required in accordance with the Ground Water Quality Standards, Chapter 173-200 WAC. The Department has determined that this discharge has a potential to pollute the ground water. Therefore the Permittee is required to evaluate the impacts on ground water quality. Monitoring of the ground water at the site boundaries and within the site is an integral component of such an evaluation.

Thirty monitoring wells have been installed throughout the sprayfield site. The earliest wells were installed in 1990 (MW-6, -7, and -8) and the latest in 2000 (MW-24 thru -27). Sampling and testing of these wells will continue in the proposed permit. The continued testing will be for permit compliance purposes and to extend the database for the ground water beneath the sub-areas of the sprayfield where enforcement limits could not be determined for this permit cycle.

Changes in the list of ground water test parameters include:

1. Replace "static water depth" with "static water elevation".
2. Eliminate conductivity testing; TDS testing is sufficient to measure the dissolved solids content of the ground water.
3. Bicarbonate testing will be added
4. The "4/year" testing frequency for cations and anions will be changed to "2/year".

The permit will eliminate the sampling, testing, and reporting of test results for the supplemental freshwater "UIW" wells. While this information is important for nutrient and water balance determinations, which are reported in the annual Irrigation and Crop Management Plan and making irrigation management decisions, this information is no longer necessary to be report to Ecology for compliance purposes. Testing of these wells by Lamb-Weston will most likely be continued to allow L-W to comply with the reporting requirements in the annual Irrigation and Crop Management Plan.

## OTHER PERMIT CONDITIONS

*REPORTING AND RECORDKEEPING*

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

*FACILITY LOADING*

The design criteria for this treatment facility are taken from 2000 and 2003 engineering report prepared by CES and are as follows:

Monthly average flow (max. month): 2.2 mgd

The permit requires the Permittee to maintain adequate capacity to treat the flows and waste loading to the treatment plant (WAC 173-216-110[4]). For significant changes in loadings to the treatment works, the permit requires a new application and an engineering report (WAC 173-216-110[5]). (**NOTE**: please see Response to Comments for changes)

*IRRIGATION AND CROP MANAGEMENT PLANS*

The irrigation and crop management plan is required to support the engineering reports, and operations and maintenance manual. This plan shall include a consideration of wastewater application at agronomic rates and should describe and evaluate various irrigation controls.

The plan shall include:

1. Compliance with the technology-based performance standards;
2. The results of the vadose zone monitoring, and trend analysis for nitrate-N and TDS relative to the Early Warning Values;
3. The estimated percent nitrate-N leached for each of the sprayfield sub-areas (G-, R-, J-, Section 3 J-, L-W, and A-fields) as described in the 2003 engineering report addendum. A five year continuous trend analysis for each sub-area shall compare these values against the value of 24%. This value represents the median and mean percent nitrate-N leach loss value for the year around application scenario for the sprayfield site (CES, 2003). The first year of the comparison shall begin with the 2004 crop year.

   Whenever the percent nitrate-N leached value for any of the sprayfield sub-areas exceeds the 24% value for two consecutive years, the Permittee shall report what actions will be taken to reduce the percent nitrate-N leached value.

   The continued exceedance of the 24% value may result in Ecology issuing an Order to require the construction of a lined winter impoundment or abandonment (permanent or temporary) of the sub-area sprayfields. (**NOTE**: please see Response to Comments for changes)
4. A continuous 3-year trend analysis of the end-of-cropping year soil profile nitrate concentration at the five foot depth for all fields. (**NOTE**: please see Response to Comments for changes)

*OPERATIONS AND MAINTENANCE*

The proposed permit contains condition S.5. as authorized under Chapter 173-240-150 WAC and Chapter 173-216-110 WAC. It is included to ensure proper operation and regular maintenance

of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

Lamb Weston submitted an update to the 1996 O&M Manual as required by the current discharge permit (CES, 2001).

*SPILL PLAN*

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee submitted, as part of the permit application, a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The plan was reviewed in November 2003.

The proposed permit requires the Permittee to review the plan periodically and send all updates to the Department.

*SOLID WASTE PLAN*

Solid wastes at the facility are disposed of in a variety of ways depending on their origin. Their disposal is explained in a Solid Waste Plan that was submitted with the permit application.

Potato solids removed from the process waste stream are collected and trucked off-site for cattle feed. Dirt, rocks, vines, etc. from the raw receiving area is collected and trucked off site to a permitted land site. Dirt removed from the raw potato washing process is sent to an on-site mud pit where it is periodically removed, allowed to dry, and hauled on or off site for land disposal.

The permit will require the submittal of any plan revisions or updates.

*GENERAL CONDITIONS*

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to ground water permits issued by the Department.

Condition G1 requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7 and G8 relate to permit renewal and transfer. Condition G9 requires the payment of permit fees. Condition G10 describes the penalties for violating permit conditions.

## RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for five years.

## REFERENCES FOR TEXT AND APPENDICES

CES, 2000. Hydrogeologic Update Report, Process Water Re-Use Fields, Lamb-Weston, Pasco, Pasco, Washington. September

CES, 2001. 2001 Updated Operation and Maintenance Manual for Lamb-Weston, Inc. Process Water Recycling System.

CES, 2001. Process Water Land Application Engineering Report, Lamb-Weston, Inc., Pasco, Washington. September

CES, 2003. Addendum to Process Water Land Application Engineering Report, Lamb-Weston, Inc., Pasco, Washington. October

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology.

Laws and Regulations( http://www.ecy.wa.gov/laws-rules/index.html )

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02.

Washington State Department of Ecology, 2000. Nitrogen Use by Crops and the Fate of Nitrogen in the Soil and Vadose Zone – A Literature Search. Publication #v00-10-015.

Washington State Department of Ecology. 2000. Nitrogen Use by Crops and the Fate of Nitrogen in the Soil and Vadose Zone. Publication No. 00-10-015

Washington State University, November, 1981. Laboratory Procedures - Soil Testing Laboratory. 38 pp.

## APPENDICES

*APPENDIX A--PUBLIC INVOLVEMENT INFORMATION*

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on June 26, 2003 in the Tri-City Herald to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on April 15, 2004 in the Tri-City Herald to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
4601 North Monroe Street
Spokane, WA 99205-1295

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509-329-3524 or by writing to the address listed above.

The Fact Sheet and permit were written by D. Nichols.

## *APPENDIX B--GLOSSARY*

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation**--The average of the measured values obtained over a calendar month's time.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**$BOD_5$**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The $BOD_5$ is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of the collection or treatment facility.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

**Continuous Monitoring** –Uninterrupted, unless otherwise noted in the permit.

**Distribution Uniformity**--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

**Engineering Report**--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

**Soil Scientist**--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

**State Waters**--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

**Total Dissolved Solids**--That portion of total solids in water or wastewater that passes through a specific filter.

**Water Quality-based Effluent Limit**--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

## *APPENDIX C--TECHNICAL CALCULATIONS*

The following technical information is attached:

1. Parametric Analysis of Variance (ANOVA) for the MW-1 and MW-2 nitrate and TDS data
2. Parametric inter-well tolerance limits for nitrate and TDS using MW-1 and MW-2 de-seasonalized data
3. Sen's slope estimators and parametric intra-well limits for nitrate and TDS for MW-7

# PARAMETRIC ANOVA

(Alt. Values)

## MW-1 and MW-2

Constituent: nitrate (mg/L)

Facility: Landfill X

Data File: LW_A5F~1

Date: 2/23/04, 2:50 PM

Client: Regulatory Use

View: LW and A-5 fields

For observations made between 04/01/1999 and 09/01/2003 the parametric analysis of variance test indicates NO VARIATION in the means of the background and compliance wells at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 0.6358
Tablulated F statistic = 3.94 with 1 and 105 degrees of freedom at the 5% significance level.

The Bonferroni t-Test indicates that no compliance well mean is significantly higher than the background. (See Contrasts Table below). The critical t (contrast) value is 1.66 with 105 degrees of freedom, 1 compliance well and a 5% error level for each well comparison.

Contrast table:

| Well | Difference | Di | Significantly Higher? |
|---|---|---|---|
| MW-2 | 0.336 | 0.699 | NO |

Where the difference of a well is greater than the critical (Di) value the hypothesis of a single population should be rejected.

The Chi-Square normality test on the residuals passed without transformation. Levene's test for equality of variance passed without transformation.



### ONE-WAY PARAMETRIC ANOVA TABLE

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F |
|---|---|---|---|---|
| Between Wells | 3.018 | 1 | 3.018 | 0.6358 |
| Error Within Wells | 498.4 | 105 | 4.747 | |
| Total | 501.5 | 106 | | |

# PARAMETRIC ANOVA

(Alt. Values)

## MW-1 and MW-2

Constituent: TDS (mg/L)

Facility: Landfill X

Data File: LW_A5F~1

Date: 2/23/04, 2:54 PM

Client: Regulatory Use

View: LW and A-5 fields

For observations made between 04/01/1999 and 09/01/2003 the parametric analysis of variance test indicates NO VARIATION in the means of the background and compliance wells at the 5% significance level. Because the calculated F statistic is less than or equal to the tabulated F statistic, the hypothesis of a single homogeneous population is accepted.

Calculated F statistic = 1.533e-002
Tablulated F statistic = 3.943 with 1 and 103 degrees of freedom at the 5% significance level.

The Bonferroni t-Test indicates that no compliance well mean is significantly higher than the background. (See Contrasts Table below). The critical t (contrast) value is 1.66 with 103 degrees of freedom, 1 compliance well and a 5% error level for each well comparison.

Contrast table:

| Well | Difference | Di | Significantly Higher? |
|---|---|---|---|
| MW-2 | -0.886 | 11.9 | NO |

Where the difference of a well is greater than the critical (Di) value the hypothesis of a single population should be rejected.

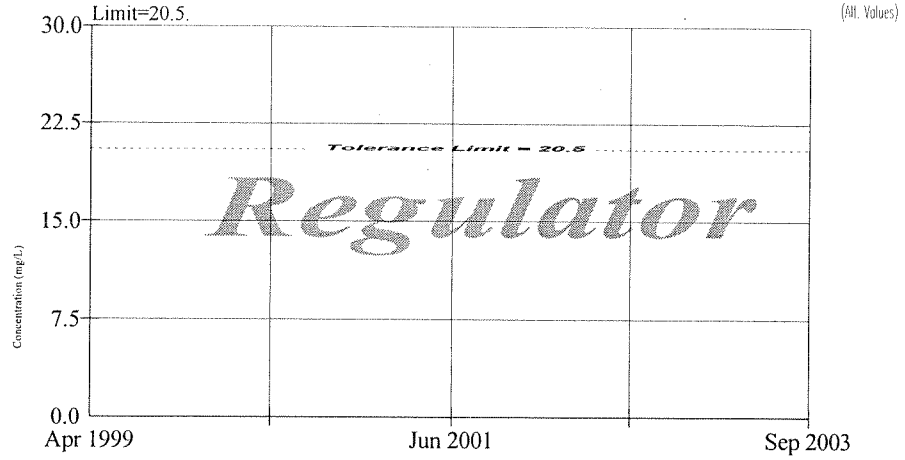
The Chi-Square normality test on the residuals passed without transformation. Levene's test for equality of variance passed without transformation.



### ONE-WAY PARAMETRIC ANOVA TABLE

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F |
|---|---|---|---|---|
| Between Wells | 20.59 | 1 | 20.59 | 0.01533 |
| Error Within Wells | 1.384E+005 | 103 | 1343 | |
| Total | 1.384E+005 | 104 | | |

# PARAMETRIC INTER-WELL TOLERANCE LIMIT



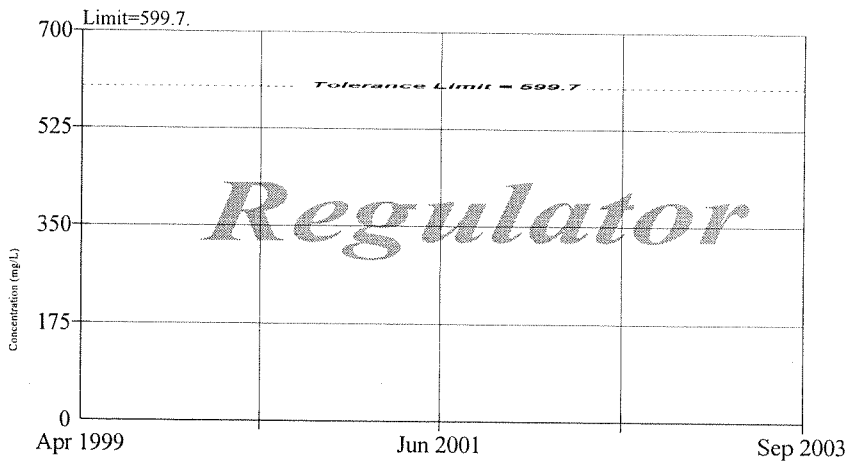

Background Data Summary: Mean=16.67, Std. Dev=2.003, 0% nds, 108 obs., 2 wells. Normality test used: Chi-Square. Testwise alpha = 0.05.

**Constituent: nitrate (mg/L)** | Facility: Landfill X | Data File: LW_A5fields

Date: 2/23/04, 3:10 PM | Client: Regulatory Use | View: LW and A-5 fields

v.8.02. For regulatory purposes only. CAS# n/a EPA m.a. 0.05 Sanitas™

# PARAMETRIC INTER-WELL TOLERANCE LIMIT



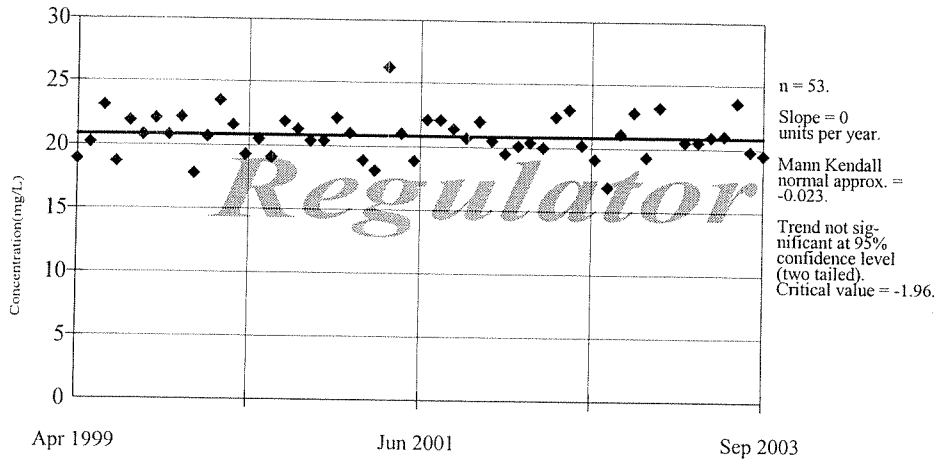

Background Data Summary: Mean=528.8, Std. Dev=37, 0% nds, 106 obs., 2 wells. Normality test used: Chi-Square. Testwise alpha = 0.05.

**Constituent: TDS (mg/L)** | Facility: Landfill X | Data File: LW_A5fields

Date: 2/23/04, 3:11 PM | Client: Regulatory Use | View: LW and A-5 fields

## Deseasonalizd: MW-1 and MW-2 data

# SEN'S SLOPE ESTIMATOR
## MW7



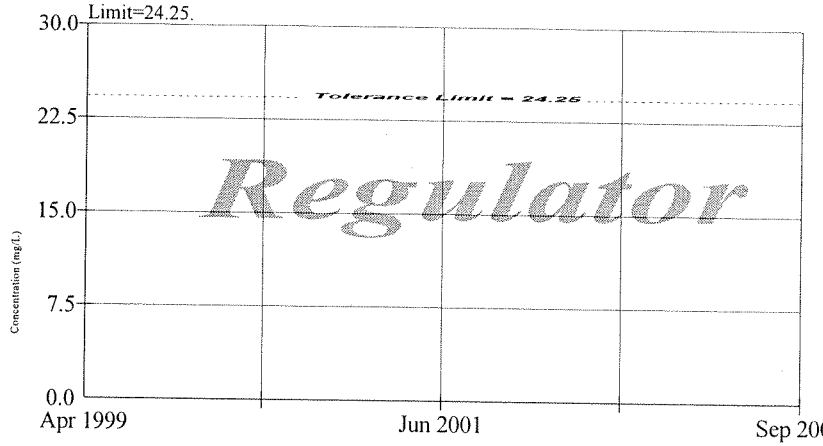

**Constituent: nitrate (mg/L)**
Date: 2/23/04, 3:16 PM

Facility: Landfill X
Client: Regulatory Use

Data File: LW8_Afields
View: LW-8 and A-fields

v.8.02. For regulatory purposes only. CAS# n/a EPA m.a. 0.05 Sanitas™

# PARAMETRIC INTRA-WELL TOLERANCE LIMIT
## MW7




95% coverage. Background Data Summary: Mean=20.83, Std. Dev=1.671, 0% nds, 53 obs. Normality test used: Shapiro-Francia. W Statistic for background data = 0.9682, W Quantile = 0.957. Testwise alpha = 0.05.

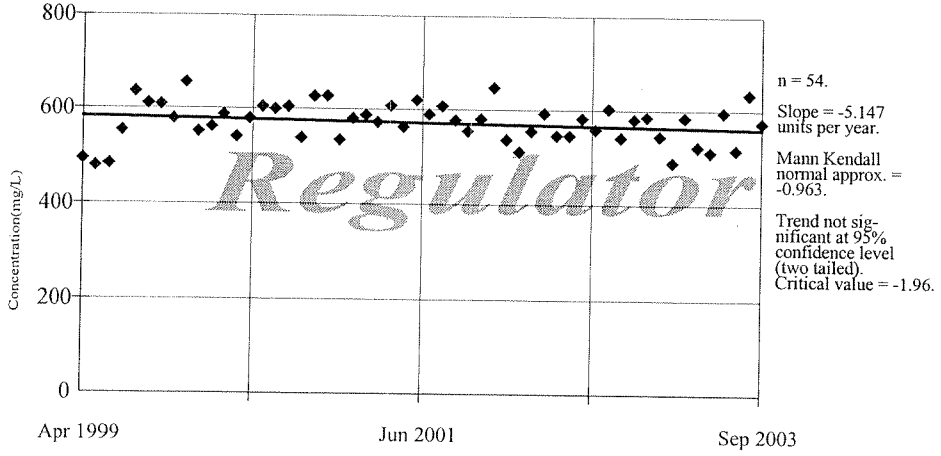
**Constituent: nitrate (mg/L)**
Date: 2/23/04, 3:17 PM

Facility: Landfill X
Client: Regulatory Use

Data File: LW8_Afields
View: LW-8 and A-fields

v.8.02. For regulatory purposes only. CAS# n/a EPA m.a. 0.05 Sanitas™

# SEN'S SLOPE ESTIMATOR
## MW7




**Constituent: TDS (mg/L)**
Date: 2/23/04, 3:22 PM

Facility: Landfill X
Client: Regulatory Use

Data File: LW8_Afields
View: LW-8 and A-fields

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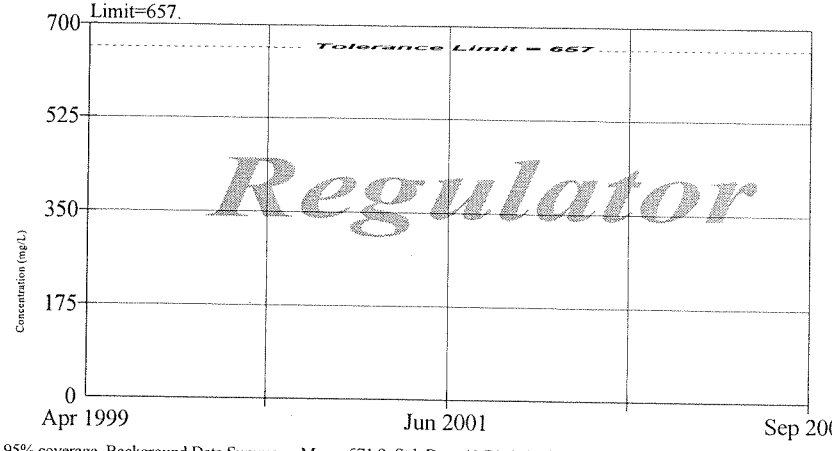
# PARAMETRIC INTRA-WELL TOLERANCE LIMIT
## MW7




95% coverage. Background Data Summary: Mean=571.8, Std. Dev=41.74, 0% nds, 54 obs. Normality test used: Shapiro-Francia. W Statistic for background data = 0.9863, W Quantile = 0.9575. Testwise alpha = 0.05.

**Constituent: TDS (mg/L)**
Date: 2/23/04, 3:22 PM

Facility: Landfill X
Client: Regulatory Use

Data File: LW8_Afields
View: LW-8 and A-fields

## *APPENDIX D--RESPONSE TO COMMENTS*

Comments were received on the draft permit from the Permittee in a letter dated May 13, 2004. Those comments and Ecology's responses are attached.

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|

ConAgra Foods

ConAgra Foods Foodservice Company
*Specialty Potato Products*
Pasco Plant
960 Glade Road North
P.O. Box 2324
Pasco, WA 99302

TEL: 509-547-8851
FAX 509-545-8203



May 13, 2004

Mr. Don Nichols
Permit Coordinator
Department of Ecology
4601 N. Monroe
Spokane, WA 99205

**Subject: Comments on Draft State Waste Discharge (SWD) Permit No. ST 5309**

Dear Mr. Nichols:

Lamb-Weston has reviewed the Draft State Waste Discharge Permit ST 5309 and has prepared the following comments on the Fact Sheet and Permit:

**GENERAL COMMENTS**

**Fact Sheet-** All factual review comments were incorporated into the public review draft except on Fact Sheet Page 7, 4th paragraph. The units for "...crop's water requirement..." as shown cannot be "million gallons per day". The units must be million gallons **per year**.

**Permit Conditions-** In the Special Conditions S5 Operations and Maintenance, excerpts from the Engineering Report and the Engineering Report Addendum were used out of context to establish limits. Specific comments about the permit and permit conditions with requests for changes are as follows:

**SPECIFIC COMMENTS**

**Page 9 – Condition S2.E** – Crop Monitoring (parameter table)

Comment: The requirement to report both crude protein and Total Kjeldahl Nitrogen (TKN) is redundant.

Lamb Weston

Fact Sheet Comment:

1. Thank you for pointing out the typo error; page 7 of the Fact Sheet will be changed.

Comment: Remove crude protein from crop monitoring

Response: It is agreed that crude protein should be removed from the crop monitoring requirements in Section S2.E of the permit.

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| Crude protein is calculated from TKN and only TKN is used in nitrogen removal calculations. Crude protein should be removed from the list of required parameters.<br><br>**Page 15 – Condition S5.C.7.** – *"Leaching will be done when necessary and only during late winter (February). The leaching requirement shall be met using precipitation and fresh water (not mixed with any wastewater)."*<br><br>Comments: 1) The word "February" used to define late winter was not the intent of the Engineering Report and is too limiting to be practical in actual operations.<br>2) The wording appears to prohibit all winter process water application because it might cause leaching.<br>The existing system is designed for year-round land application and some percolate loss will occur following process water irrigation. The model showed that late winter supplemental leaching, in addition to that which occurred as a result of normal winter process water irrigation, was best to control salinity with less potential impact to groundwater. The current wording is restrictive. The words "...shall be met using precipitation and fresh water ..." could be interpreted as preventing all leaching except that provided by fresh water and rainfall.<br><br>Limiting the supplemental leaching to only February would prevent January or March irrigation for salts control. Some of the fields do not have supplemental fresh irrigation water available for use until March. Late January irrigation may be needed on some fields to allow a crop to be planted in February. Restriction of supplemental leaching to February, impairs Lamb-Weston's ability to manage the system and schedule leaching with the best interests of treatment and groundwater quality protection in mind. The wording needs to be changed to allow the system to be operated as designed with year-round irrigation and normal percolate loss that results in salts leaching.<br><br>Lamb-Weston requests a wording revision to support the intent of the risk analysis in the Engineering Report Addendum to clarify:<br><br>1) that supplemental leaching performed specifically to control soil salinity will be done only during late winter.<br>2) supplemental leaching requirements will be met with fresh water.<br><br>**Page 15 – Condition S5.C.8.** – *"The net total nitrogen load to the sprayfield shall not exceed 900,000 lbs/year."*<br><br>Comment:-The 900,000 lbs total net N load limit is not representative.<br><br>LambWeston | Comment: Permit Condition S5.C.7<br><br>Response: The wording used in this section of the permit was based on the model risk assessment language used in the 2003 engineering report. This permit condition was intended to require L-W to operate the sprayfields as described in the model assessment, and to assess the risk to ground water using vadose zone monitoring.<br><br>It is now recognized that the intent of the model language was for "supplemental" leaching, and that restricting supplemental leaching to a single month in the winter is not practical for the L-W facility.<br><br>It is agreed that permit condition S5.C.7 be changed:<br><br>7. **Supplemental** ~~L~~leaching **performed to control soil salinity** will be done when necessary and only during the late winter ~~(February)~~. The **supplemental** leaching requirement shall be met using precipitation and fresh water (not mixed with any wastewater).<br><br>Comment: The 900,000 lbs total N limit in Permit Condition S5.C.8 is not representative<br><br>Response: The 900,000 lb. limit was chosen to be representative of the design limiting load to the sprayfield system. It is now understood that it was not intended to be used to define the treatment capacity of the system, but as representing the nitrogen uptake capacity as part of a 12 year crop rotation.<br><br>The intent of placing a load limit in the permit was to place more restrictive control of nitrogen loading to the sprayfields instead of just requiring loading to "..not exceed the crop requirements..." in Section S1.<br><br>It is recognized that the nitrogen treatment capacity (crop requirement) of the sprayfield site changes annually as the crop rotation is changed, and therefore does not allow the capacity to change with changing crops. Ecology agrees that the 900,000 lb value is too restrictive, but believes a nitrogen load limit value is needed for each crop rotation year.<br><br>It has been decided to make the following changes in the permit:<br><br>1. Delete the net total nitrogen load limit of 900,000 lbs/year from Section S5.C |

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|

The total net nitrogen load limit in the draft permit has been rounded down from the minimum net nitrogen capacity supplied in Table 16 of the Engineering Report by Lamb-Weston (CES, 2001). The nitrogen capacity shown in the Engineering report was specifically conservative (low estimate) and based on typical crop mixes and design loading to show that capacity beyond process water and direct fresh water nitrogen load exists under typical cropping. It was not intended to document the maximum capacity of the system. If the capacity is limited to less than the minimum amount shown in the engineering report it is likely that the crops will not receive enough nitrogen and the system will fail or perform poorly.

The land application system is a living, dynamic system whose capacity expands and contracts each year depending on the crop mix. It would be possible to calculate a crop mix providing the maximum capacity of the system but it would be more appropriate to allow the site nitrogen capacity to be calculated and reported each year in the Irrigation and Crop Management Plan. In fact, Special Condition S.1 already requires, "*Total nitrogen and water applied to the irrigation lands shall not exceed the crop requirements as determined by the Permittee's Irrigation and Crop Management Plan, Condition S8.*"

Please revise the permit language to allow Lamb-Weston to set the annual total net nitrogen load capacity in the annual Irrigation and Crop Management Plan based on actual expected cropping.

**Page 15 – Condition S5.C.9.**- "*The application of supplemental irrigation water to any field shall not exceed 8.5 inches per month whenever process wastewater is applied in the same month.*"

Comment:-Although this parameter, cited above, was a modeling limit in the risk assessment provided to Ecology in October 2003 (CES, 2003) it is not reasonable to limit the land application system operations to this value. The model was restricted to 8.5 inches of supplemental fresh water strictly to make sure the salts load would not be overstated. An overstated salts load would require more leaching which would bias the model to favor winter land application over a pond. The proposed permit provision limits the flexibility in operations to the point that the land application system crops could suffer water deficit which would limit yields and nitrogen uptake. Limited nitrogen uptake would, in turn, create greater risk to groundwater quality from greater residual soil nitrogen.

This operational limit should be removed from the permit in favor of the performance-based limits already incorporated into the permit.

**Page 15 – Condition S5.D.1**- "*Maintain a stable or declining end-of-cropping year soil profile nitrate concentration trend, at the 5-foot depth, over a continuously progressive three year period for each sprayfield.*"

Comments: 1) The 5th foot is too limited a view of the soil profile.
2) The intent of the condition should be to spur action not be compliance point.

Lamb Weston

2. Add the following new section in Section S8.D (Cropping Schedule for Upcoming Year)

   **"3. The annual total net nitrogen load capacity for the sprayfield system based on the expected cropping."**

3. A new section will be added to S2 of the permit; S2.F, Nitrogen Load Monitoring:

   **F. Nitrogen Load Monitoring**

   **The Permittee shall report the following nitrogen load values to the sprayfield system for the previous year:**

| Parameter | Units | Sample Frequency | Sample Type |
|---|---|---|---|
| Total annual net nitrogen load | Lbs | 1/ year [1] | calculated |
| Total annual net nitrogen load capacity | Lbs | 1/ year [1] | calculated |

[1] 1/year means May

Comment: Section S5.C.9, restricting the application of supplemental water to 8.5 inches.

Response: The intent of the language in S5.C.9 was to require L-W to operate the sprayfield system as was described in the risk assessment, and to assess the operation and its risk to impact the ground water using the vadose zone monitoring system. It was believed that this limit would restrict the amount of leaching from the root zone.

It is recognized that other permit conditions (S6.C.6 and S8.A.6) limit the amount of leaching from the sprayfield and tha this "operational limit" is not needed.

Section S5.C.9 will be removed from the permit.

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| The requirement to use only the 5th foot is limiting and taken out of the context of the Hydrogeologic Update Study (CES, 2000) and Engineering Report Addendum (CES, 2003) recommendations. The total soil profile nitrate content is a better indicator of increasing or decreasing residual soil nitrate and the potential to leach nitrate to groundwater. The fifth foot provides only a narrow view of soil nitrate dynamics. Lamb-Weston already measures and is required to measure soil nitrate to five feet in depth in one-foot increments. The sum of the nitrogen results from that testing provides a good indicator of increasing or decreasing nitrate and accumulation of excess, leachable nitrate in the soil in each field.<br><br>Under best management practices, soil profile nitrate trend monitoring is a tool to guide winter irrigation management and not an applicable compliance point. Increases in stored soil profile nitrogen can be managed through irrigation control and cropping. An increasing trend can be used to trigger action to manage irrigation in the winter to control percolate loss and minimize nitrate leaching. Cropping can then be used to take up the residual nitrogen the following crop year.<br><br>The compliance item can be revised by using the first and last sentences from the Nutrient Management compliance recommendation in the Hydrogeologic Update Study and Engineering Report Addendum. It will require review of soil profile nitrate trends followed by changes to winter irrigation plans to limit percolate loss if stored soil nitrate is increasing.<br><br>**Page 17 – Condition S8.A.3.**- "*Calculated water balance. The calculations shall include irrigation system efficiency and application uniformity, the quantity of supplemental irrigation water and process wastewater applied, crop consumptive use, water stored in the soil profile outside of the normal growing season, and salt leaching requirements.*"<br><br>Comments:- Good water balances should have soil water content for the whole year, not just outside the growing season. It is necessary to track soil moisture in each time step to be able to estimate percolate losses. Lamb-Weston currently estimates monthly soil water content in its water balances and reports percolate loss estimates for each crop annually.<br><br>Please remove the reference to "...outside the growing season..." because Lamb-Weston calculates soil water content for all months in the year.<br><br>**Page 17 – Condition S8A.4.**- "*The report shall include a continuous 3-year trend analysis of the end-of-cropping year soil profile nitrate concentration at the five-foot depth for all fields.*"<br><br>Comments:- Please revise this language in this condition to match the language and intent of the requested changes in Condition S5.D.<br><br>Lamb Weston | Comment: Permit condition S5.D.1, maintaining a stable or declining soil profile nitrate concentration trend.<br><br>Response: It is agreed that monitoring the trend in nitrate over the entire soil profile would be a better indicator of leachable nitrogen.<br><br>The language in S5.D.1 was not intended to be a compliance point, but rather an operational tool. That is why it was put in Section S5, OPERATION AND MAINTENANCE.<br><br>It is agreed that the language in the 2000 HG Report for Nutrient Management compliance points (page 19) to show ground water is being protected can be substituted for the language in S5.D.1.<br><br>The following changes will be made to S5.D.1:<br><br>D. Best Management Practices\Pollution Prevention Program<br><br>1. ~~Maintain a stable or declining end-of-cropping-year soil profile nitrate concentration trend, at the 5-foot depth, over a continuously progressive three-year period for each sprayfield.~~<br><br>**Stable or declining end-of-cropping-year soil profile nitrate concentration trends over three years, based on the summation of the soil nitrate testing in Section S2.D**<br><br>**2. Adjust irrigation plans in low evapotranspiration periods to minimize percolate losses on fields with soil nitrate increase.**<br><br>Comment: S8.A.3, Calculated water balance<br><br>Response: The language in the draft permit is standard permit shell language and can be changed if a supported reason is given<br><br>Given that L-W calculates monthly the soil water content as part of its water balance and reports the annual percolate loss for each crop, it is agreed that the requirement for reporting the water stored "..outside of the normal growing season.." is not needed. In addition, this condition will amended to require the reporting of the percolate loss for each crop annually.<br><br>The following changes will be made to Condition S8.A.3: |

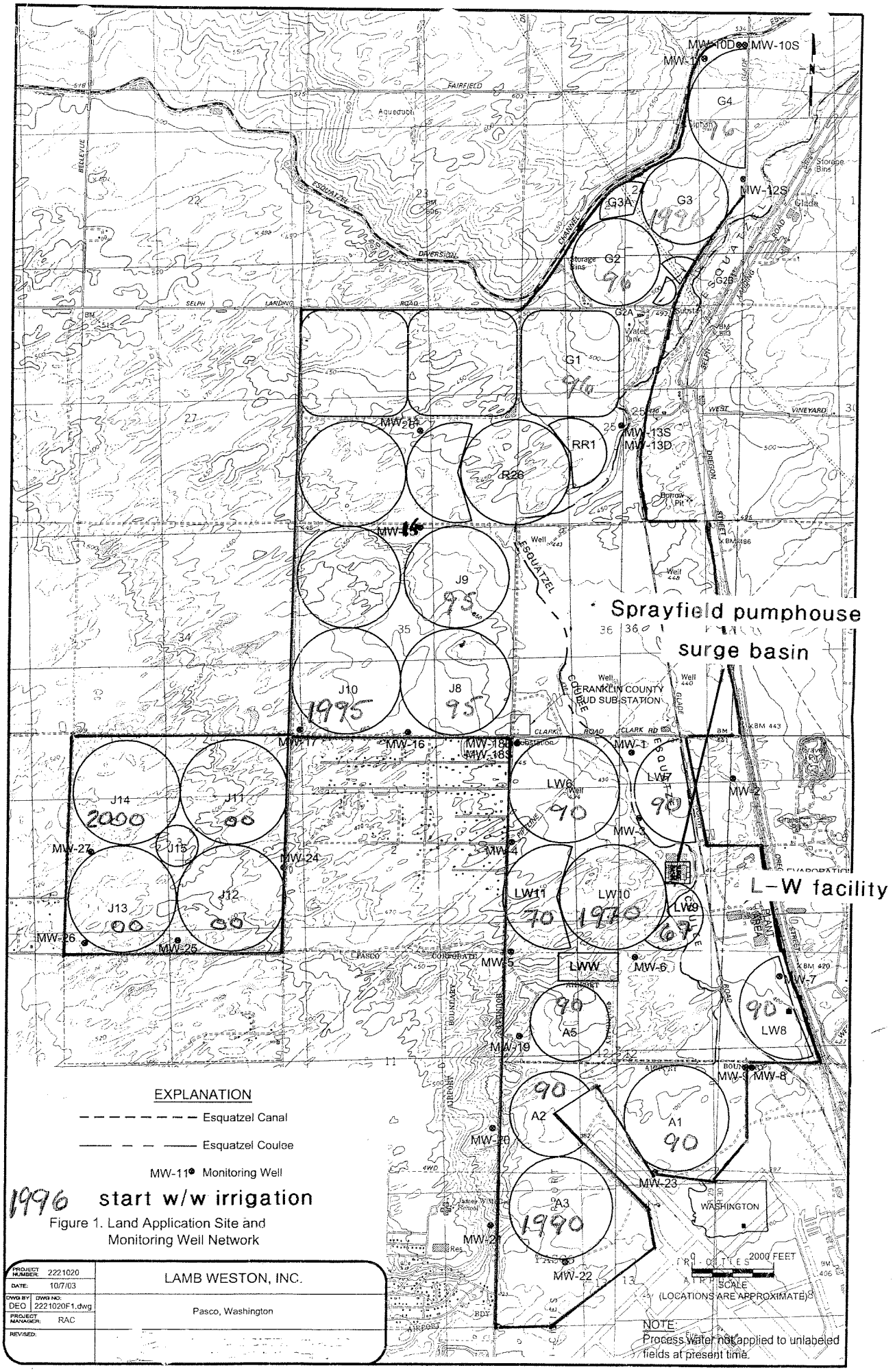
| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| **Page 17 – Condition S8.A.6.**- *"Whenever the percent nitrate-N leached value for any of the sprayfield sub-areas exceeds the 24% value for two consecutive years, the permittee shall report what actions will be taken to reduce the percent nitrate-N leached value."*<br><br>Comments: 1) 24% projected nitrate loss was a 12-yr average and can't be met every year.<br>2) The permit limits projected nitrate loss to within sub-areas not the entire site.<br>3) The permit differs from the Fact Sheet in emphasis and seriousness of the 24% nitrate loss value compliance.<br><br>The 24% nitrate loss reported in the risk analysis submitted to Ecology was the average of 12 years of estimated nitrate losses (CES, 2003). The standard deviation of the calculated nitrate loss was +/- 12%. It is not practical to set an average from a normally distributed set of model predictions as a permit limit. Please allow Lamb-Weston to manage estimated nitrate loss to +/- one standard deviation from the mean.<br><br>Sub-area averages are not appropriate within the context of the model as run and reported in the Engineering Report Addendum (CES, 2003). The 24% nitrate loss was a site-wide average. Sub-area averages will vary depending on cropping and leaching requirements based on irrigation and salts loading rates. Please change the requirement so that compliance is based on the calculated average nitrate loss for the entire site.<br><br>The permit calls for review of 5-year trends but two consecutive years out of compliance requires an action plan to reduce nitrate loss. The Fact Sheet, on page 23, directly states that continued exceedance of the 24% will result in actions that could include requirements to build a pond or abandon (temporary or permanent) a sub-area. However, page 20 of the Fact Sheet includes a number of options for enforcement and action that are more creative and practical. Lamb Weston requests that the Fact Sheet language on page 23 be changed or specially noted to resemble the tone and language and include the full range of options as shown on Fact Sheet page 20.<br><br>**Page 18 – Condition S8C.3.**- *"Vadose zone trends for nitrate-N and TDS shall be determined on a current year and three year basis. The trends shall be compared to the respective Early Warning Value. The narrative will include an evaluation of the performance of the sprayfield sub-areas and the ability to achieve or be less than the early warning values."*<br>Comments: -The early warning concentrations are equal to groundwater background tolerance limits. The TDS cannot be met and nitrate will be difficult to meet because some irrigation well water quality exceeds the tolerance limits.<br><br>The TDS limit is exceeded by four supplemental fresh water wells. Crop water use concentrates salts so percolate salinity under good irrigation management with minimum leaching will exceed 600 mg/L. Nitrate in seven supplemental fresh irrigation water wells exceeds one or more of the early warning values so leaching with fresh water will exceed the nitrate limit. It seems appropriate to collect vadose zone data but requiring Lamb-Weston to determine how to manage to less than the early warning values is not<br><br>LambWeston | 3. Calculated water balance. The calculations shall include irrigation system efficiency and application uniformity, the quantity of supplemental irrigation water and process wastewater applied, crop consumptive use, water stored in the soil profile, **percolate loss for each crop annually,** ~~outside the normal growing season,~~ and salt leaching requirements.<br><br>Comment: Condition S8.A.4, continuous 3-year trend analysis.<br><br>Response: Agreed, the trend analysis at the five foot depth will be eliminated to coincide with the changes made in Condition S5.D. The following changes will be made to S8.A.4:<br><br>4. Soil testing results. A summary of the soil testing results shall be submitted and discussed as part of the annual Irrigation and Crop Management Plan.<br><br>The report shall include a continuous 3-year trend analysis of the end-of-cropping year soil profile nitrate concentration **based on the soil testing in S2.**D ~~at the five foot depth~~ for all fields.<br><br>Comment: Condition S8.A.6, percent nitrate-N leached exceeds 24%.<br><br>Response: It is acknowledged that the 24% nitrate-N loss value is an average for the entire sprayfield site. Therefore, 50% of the values collected during the permit cycle could be higher than this number. It is reasonable to request that the value be required for the entire site and that one standard deviation be allowed to allow for the statistical variability in the data.<br><br>The following changes will be made in Section S8.A.6:<br><br>6. The percent nitrate-N leached shall be estimated for each of the sprayfield sub-areas (G-, R-, J-, Section 3 J-, L-W, and A-fields) as described in the 2003 engineering report addendum. A five year continuous trend analysis for each sub-area shall compare these values against the value of 24% $\pm$ **12%**. The first year of the comparison shall begin with the 2004 crop year.<br><br>Whenever the percent nitrate-N leached value for ~~any of the~~ **the entire** sprayfield ~~sub-areas~~ **area** exceeds the 24% $\pm$ **12%** value for two consecutive years, the Permittee shall report what actions will be taken to reduce the percent nitrate-N leached value |

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| possible given the nature of salts and the existing irrigation water quality. Concentrations less than the early warning value is likely to be impossible especially for TDS. It is more appropriate for Lamb-Weston to review the vadose zone data to manage the percolate loads to groundwater as best as possible to minimize potential for impacts.<br><br>Please revise the language to reflect an iterative feedback process to gather the vadose zone monitoring data for informational purposes and to use it for site management and comparison to early warning values.<br><br>**Page 18 – Condition S9.**- Compliance Schedule<br>Comments: -The requirement to connect all permitted acreage by 2006 does not address Permit compliance.<br><br>There is no need to require all acreage to be connected at this time because the Draft Permit has incorporated performance-based criteria to monitor and control system operations. The current average flow per acre on 2,500 acres is less than the Engineering Report average design process water flow per acre with 3,119 acres available (CES, 2001). There is no need to expand the land application acreage at this time.<br><br>Lamb-Weston requests that this condition be removed or revised to require connecting the additional fields in order to maintain adequate acreage consistent with the design loading in the Engineering Report (CES, 2001).<br><br>Thank you for the opportunity to provide these comments on the draft permit. Please call me at (509) 547-8851 ext. 68200 or Cliff Stevens at (509) 547-8851 ext. 68700 if you have any questions.<br><br>Sincerely,<br><br>Doug Beyer<br>Manufacturing Manager<br>Lamb Weston Pasco<br><br>Lamb Weston | The language on page 23 of the Fact Sheet states what Ecology "..may.." do if the nitrate-N leaching from the sprayfield site exceeded 24% for two consecutive years. It is recognized that this language is more prescriptive and onerous than the language on page 20 that describes what Ecology could do if downgradient values for TDS and nitrate-N trended toward the EWV's. It is agreed that the language on page 23 should be less prescriptive and coincide with that used on page 20.<br><br>The language on page 23 of the Fact Sheet reads:<br><br>"The continued exceedance of the 24% value may result in Ecology issuing an Order to require the construction of a lined winter impoundment or abandonment (permanent or temporary) of the sub-area sprayfields."<br><br>This will not be changed. Instead, the following will be added to the narrative to direct the reader to this explanation:<br><br>(**NOTE**: please see Response to Comments for changes)<br><br>Comment: Condition S8.C.3, vadose zone nitrate and TDS trend analysis.<br><br>Response: As explained in the Fact Sheet, the intent of the early warning values (EWVs) was to use them as an irrigation and cropping management tool and to help verify the results of the risk assessment modeling in the 2003 engineering report. It was thought that percolate loses of nitrate-N and TDS less than or equal to the EWVs could be achieved. Given the high TDS and nitrate values in the supplemental irrigation water, it is unsure if the EWVs can be achieved. Since the EWVs are equal to the background ground water quality, if they can not be met by the sprayfield system even with using only supplemental irrigation water, then Ecology may have to consider using "overriding public interest" to continue to allow the sprayfields to be used for the next permit cycle.<br><br>Given the high nitrate and TDS values in the supplemental water, Ecology agrees to change the language in S8.C.3 for this permit cycle. The change will require L-W to inform Ecology what adjustments or changes in the irrigation and crop management of the sprayfield system will be made to minimize percolate loses.<br><br>The following changes in S8.C.3 will be made:<br><br>3. Vadose zone trends for nitrate-N and TDS shall be determined on a current year and three year basis. The trends shall be compared to the respective Early Warning |

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| | Value. The narrative will include an evaluation of the performance of the sprayfield sub-areas and **adjustments made in the irrigation and crop management of the site to minimize percolate loses of nitrate and TDS.** ~~the ability to achieve or be less than the early warning values~~.<br><br>Comment: Condition S9, Compliance Schedule<br><br>Response: Ecology acknowledges that the current average flow to the sprayfield system is less than the design flow given in the engineering report, but believes there is a need to bring the system to its full design acreage at a time when the average flow meets the design flow.<br><br>It has been decided to use the language in NPDES permits for municipal treatment systems that requires facility updates whenever the discharge reaches 85% of the design flow. When the annual daily average flow or total annual flow from the processing facility reaches 85% of the design flow (2.2 mgd), then the sprayfield must be brought to its full design capacity; 3119 acres.<br><br>Since this is no longer a compliance issue but instead a design issue, Section S9 of the permit will be illiminated. The new language will be put into Section S4, FACILITY LOADING.<br><br>The following changes will be made:<br><br>~~S9. COMPLIANCE SCHEDULE~~<br><br>A. ~~No later than April 1, 2006, the Permittee shall have all available sprayfield acreage (3119 acres) on line and in use for wastewater treatment. The Permittee shall submit a letter to the Department announcing the online operation of the acreage~~.<br><br>**S4. FACILITY LOADING**<br><br>A. Design Criteria<br><br>Flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded: |

| COMMENTS TO SWDP 5309, Lamb-Weston Pasco | RESPONSES |
|---|---|
| | Average flow for the maximum month: 2.2 MGD<br><br>**B. <u>Plans for Expanding Sprayfield Acreage</u>**<br><br>**The Permittee will submit to the Department a plan for bringing the sprayfield system to its full capacity (3119 acres) when the average flow for the maximum month or total annual flow from the processing facility reaches 85% of the design flow (1.87 MGD, or 683 million gallons).**<br><br>**The plan shall be submitted no later than sixty (60) days after reaching the 85% design flow value. It shall include what steps will be taken to bring all acreage on line and a time line for its completion.**<br><br>The SUMMARY OF PERMIT REPORT SUBMITTALS on page 4 of the permit will also be changed to eliminate S9 and add S4.B as a conditional report requirement. |

## *APPENDIX E—FIGURES AND GRAPHS*




EXPLANATION

Esquatzel Canal

Esquatzel Coulee

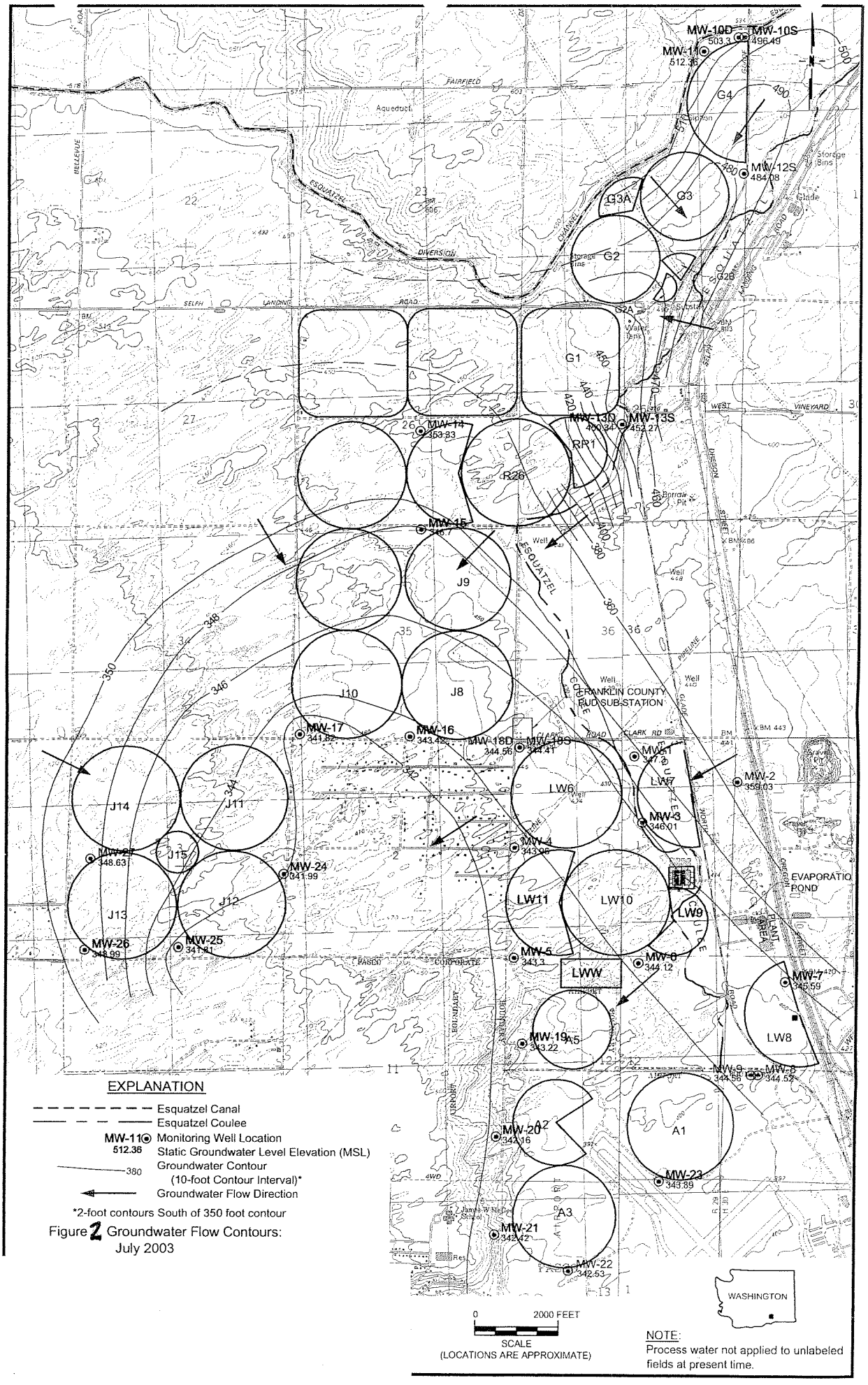
MW-11 Monitoring Well

1996 start w/w irrigation

Figure 1. Land Application Site and Monitoring Well Network

| | |
|---|---|
| PROJECT NUMBER: 2221020 | LAMB WESTON, INC. |
| DATE: 10/7/03 | |
| DWG BY: DEO / DWG NO: 2221020F1.dwg | Pasco, Washington |
| PROJECT MANAGER: RAC | |
| REVISED: | |

NOTE:
Process water not applied to unlabeled fields at present time.




EXPLANATION

- Esquatzel Canal
- Esquatzel Coulee
- MW-11 ⊙ Monitoring Well Location
- 512.36 Static Groundwater Level Elevation (MSL)
- 380 Groundwater Contour (10-foot Contour Interval)*
- Groundwater Flow Direction

*2-foot contours South of 350 foot contour

Figure 2 Groundwater Flow Contours: July 2003

NOTE:
Process water not applied to unlabeled fields at present time.

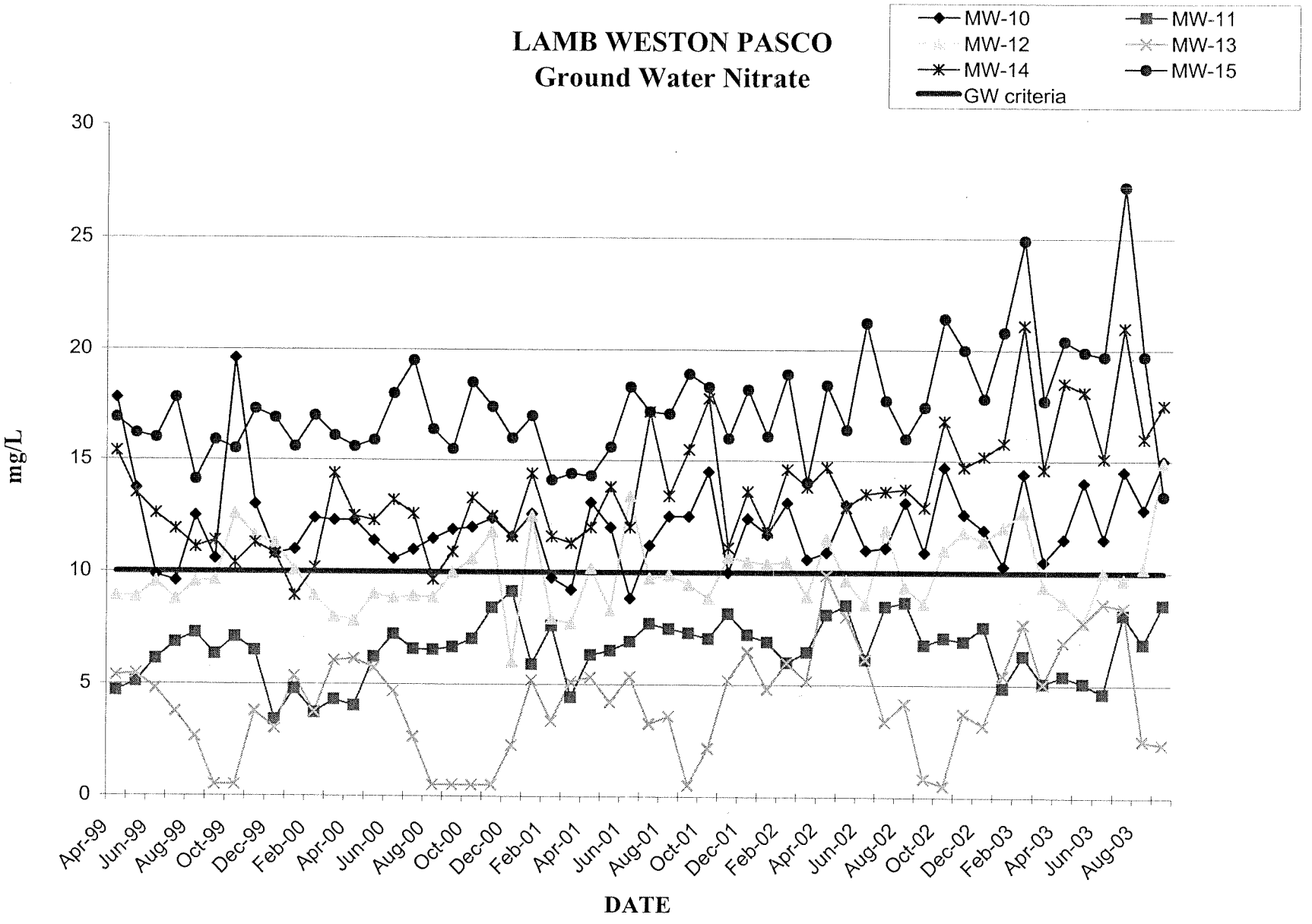

LAMB WESTON PASCO
Ground Water Nitrate
MW-10
MW-11
MW-12
MW-13
MW-14
MW-15
GW criteria
mg/L
30
25
20
15
10
5
0
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 3

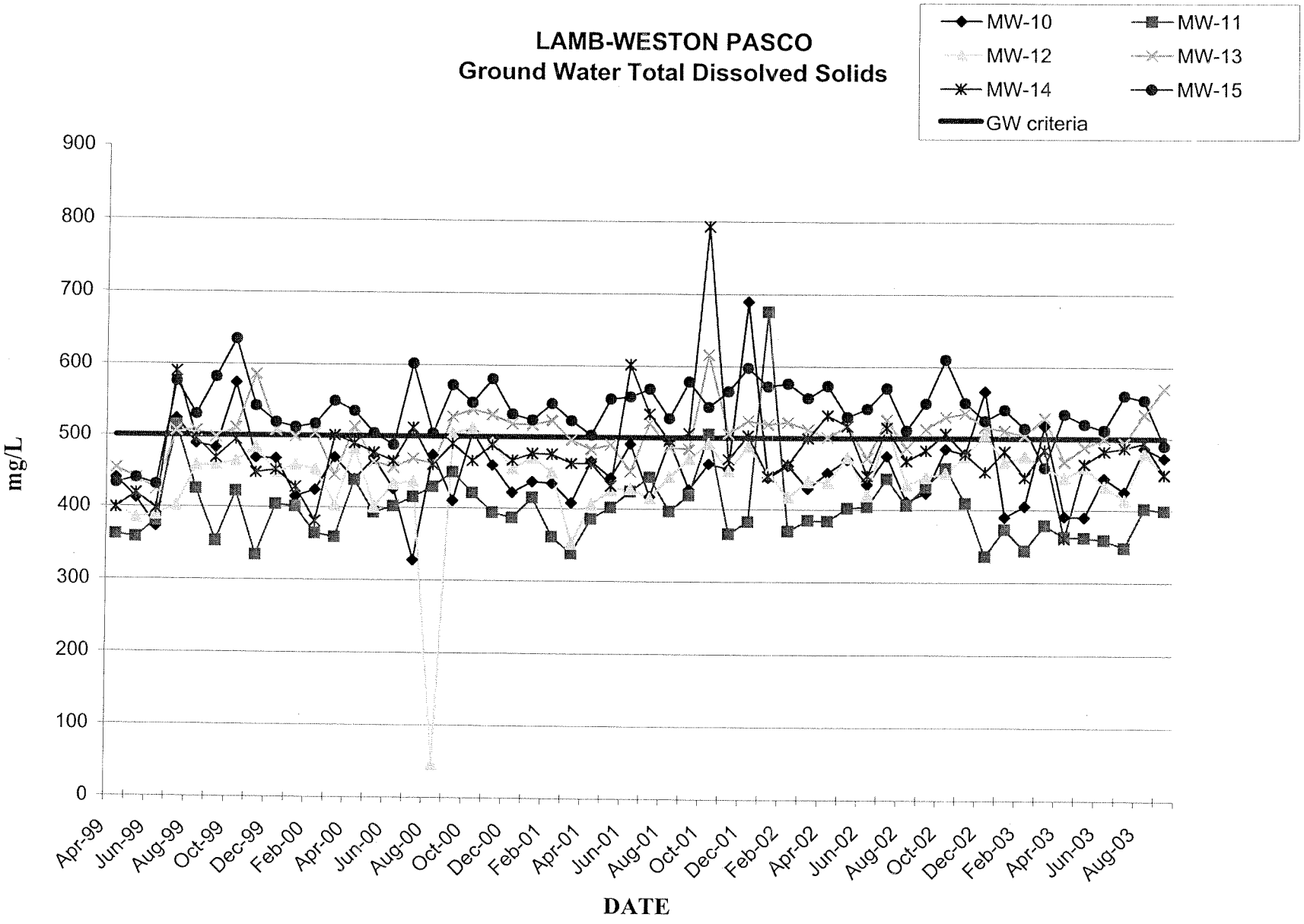

LAMB-WESTON PASCO
Ground Water Total Dissolved Solids
MW-10
MW-11
MW-12
MW-13
MW-14
MW-15
GW criteria
900
800
700
600
500
400
300
200
100
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 4

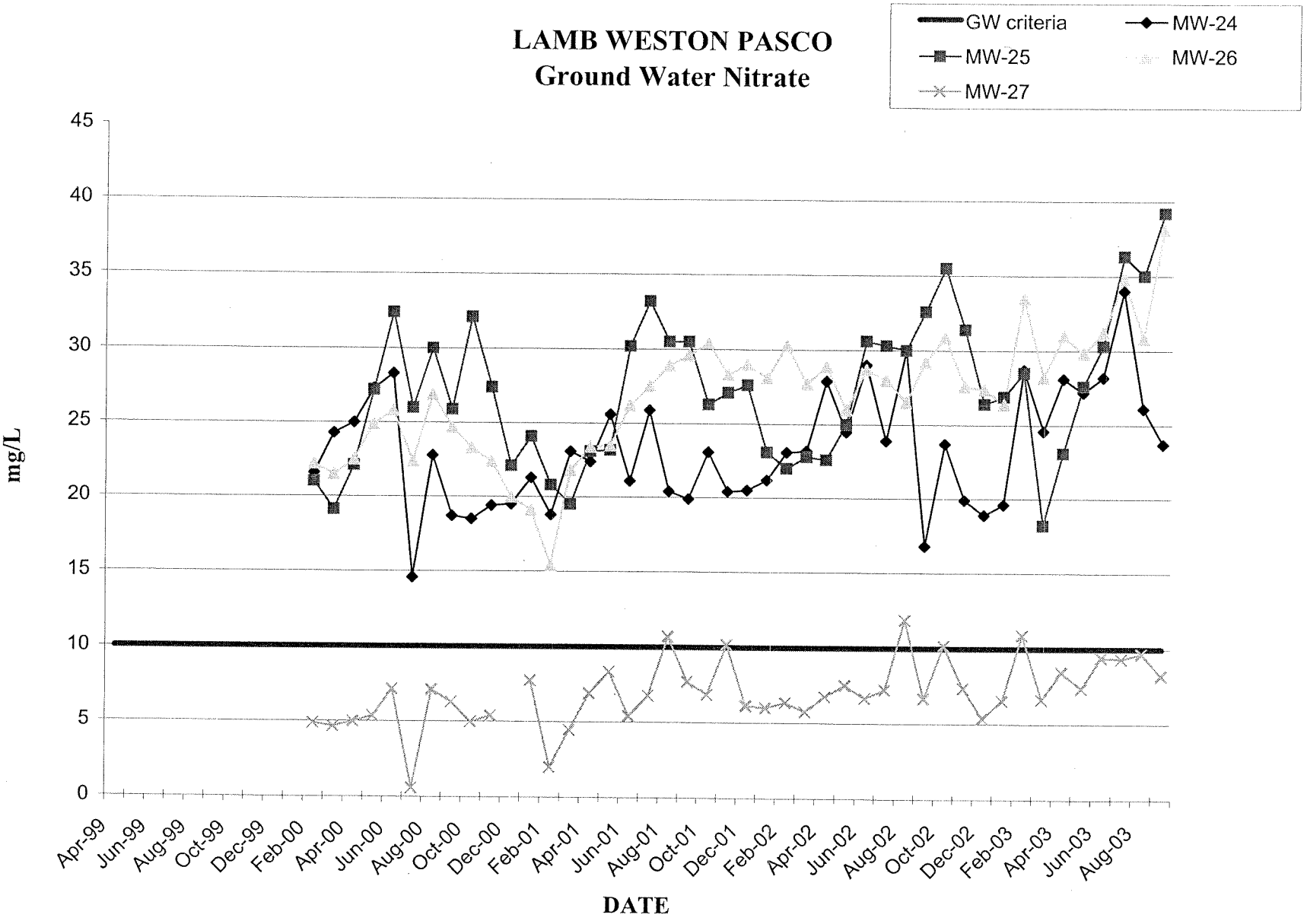

LAMB WESTON PASCO
Ground Water Nitrate
GW criteria
MW-24
MW-25
MW-26
MW-27
mg/L
45
40
35
30
25
20
15
10
5
0
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 5

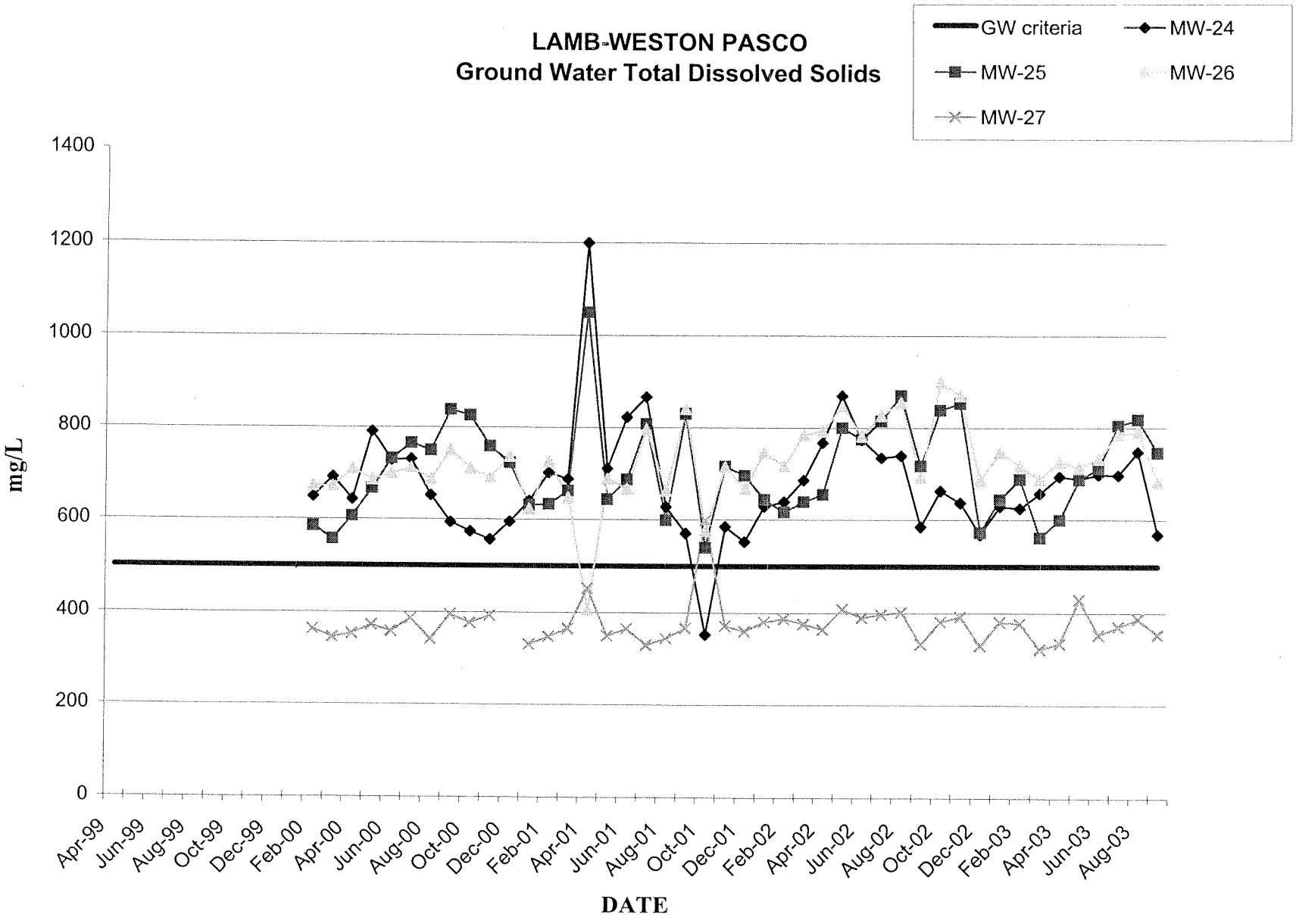

LAMB-WESTON PASCO
Ground Water Total Dissolved Solids
GW criteria
MW-24
MW-25
MW-26
MW-27
1400
1200
1000
800
600
400
200
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 6

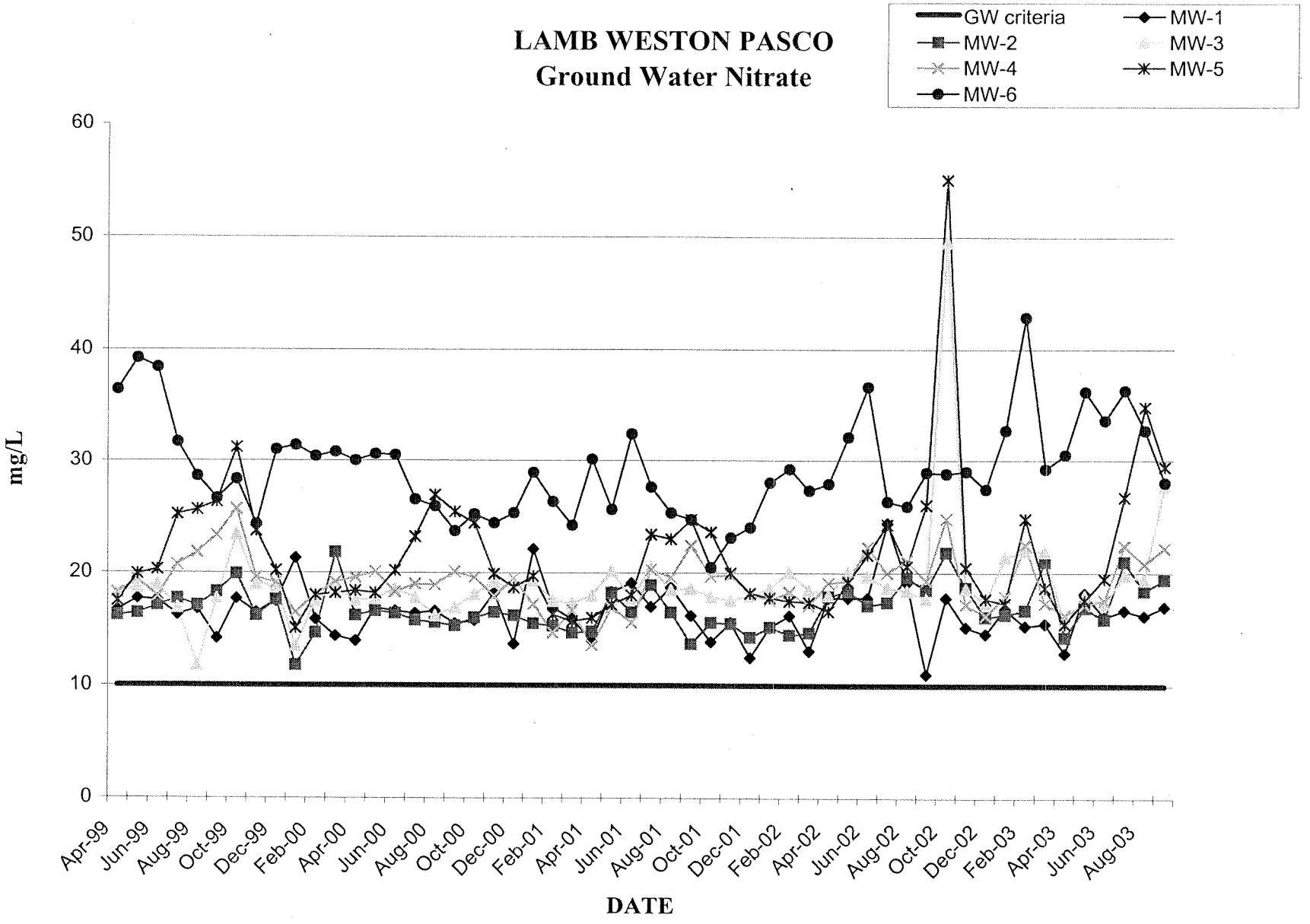

LAMB WESTON PASCO
Ground Water Nitrate
GW criteria
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
60
50
40
30
20
10
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 7

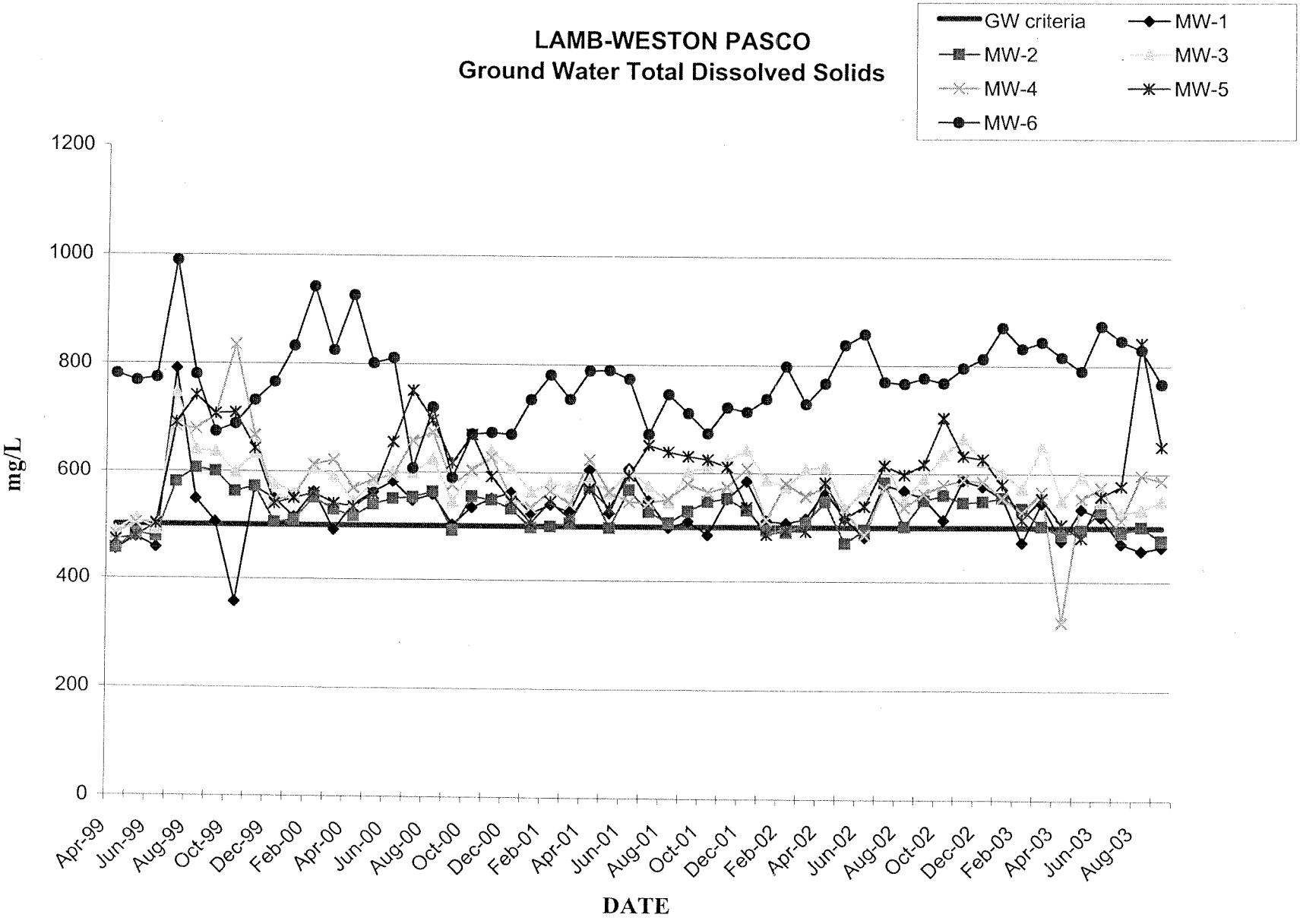

LAMB-WESTON PASCO
Ground Water Total Dissolved Solids
GW criteria
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
1200
1000
800
600
400
200
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 8

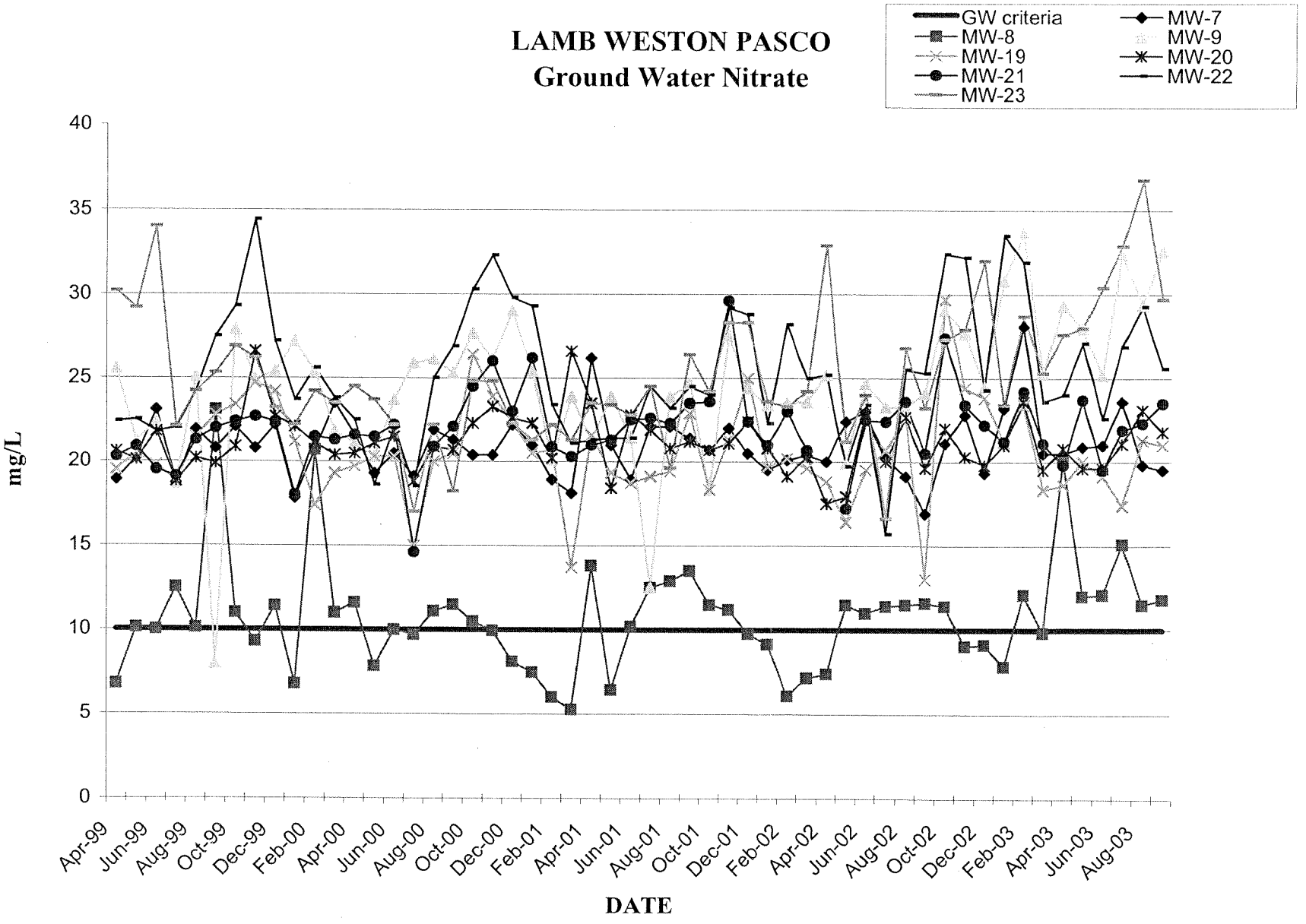

LAMB WESTON PASCO
Ground Water Nitrate
GW criteria
MW-7
MW-8
MW-9
MW-19
MW-20
MW-21
MW-22
MW-23
mg/L
DATE
0
5
10
15
20
25
30
35
40
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03

Fig. 9

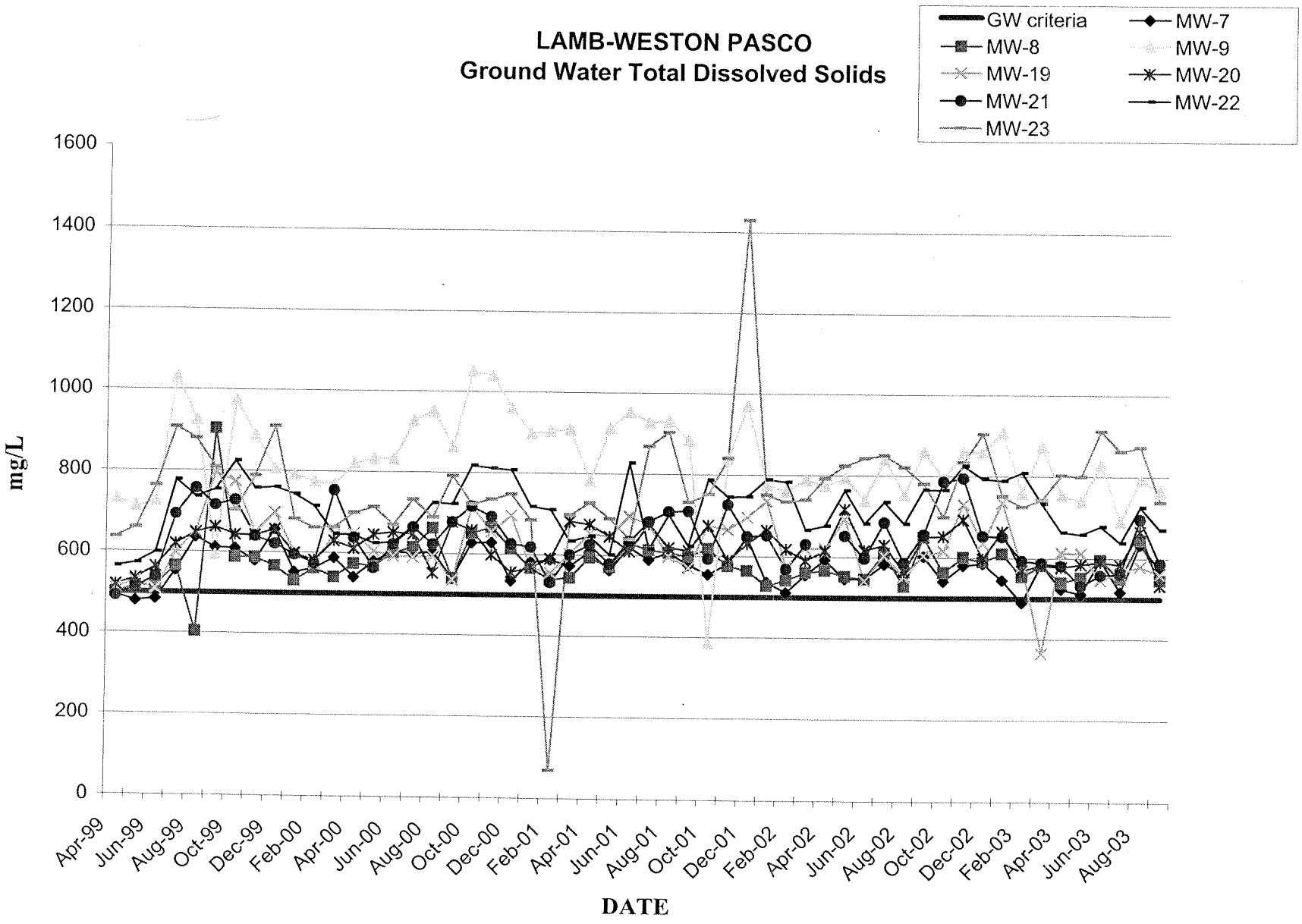

LAMB-WESTON PASCO
Ground Water Total Dissolved Solids
GW criteria
MW-7
MW-8
MW-9
MW-19
MW-20
MW-21
MW-22
MW-23
1600
1400
1200
1000
800
600
400
200
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 10

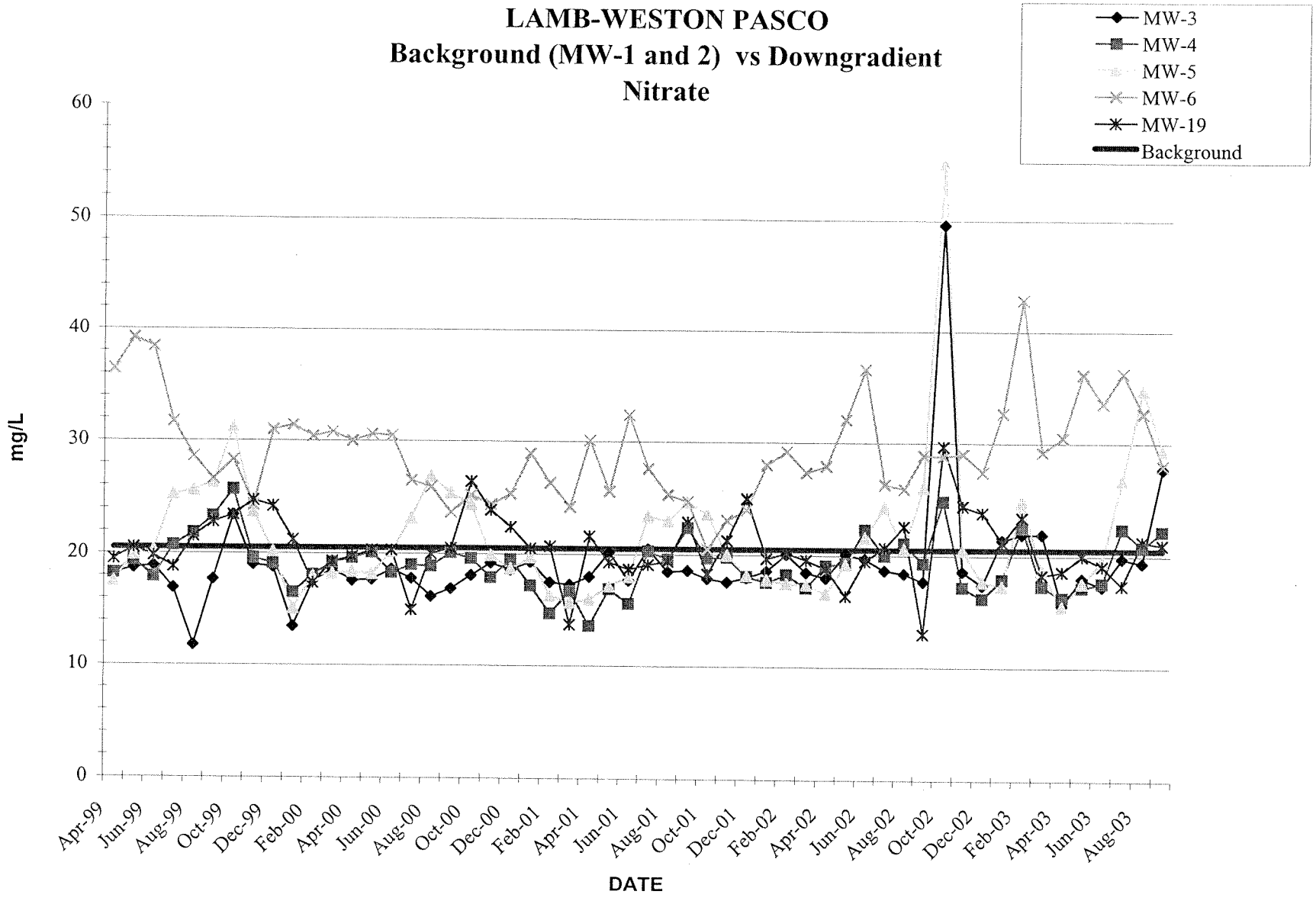

LAMB-WESTON PASCO
Background (MW-1 and 2) vs Downgradient
Nitrate
MW-3
MW-4
MW-5
MW-6
MW-19
Background
mg/L
60
50
40
30
20
10
0
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 11

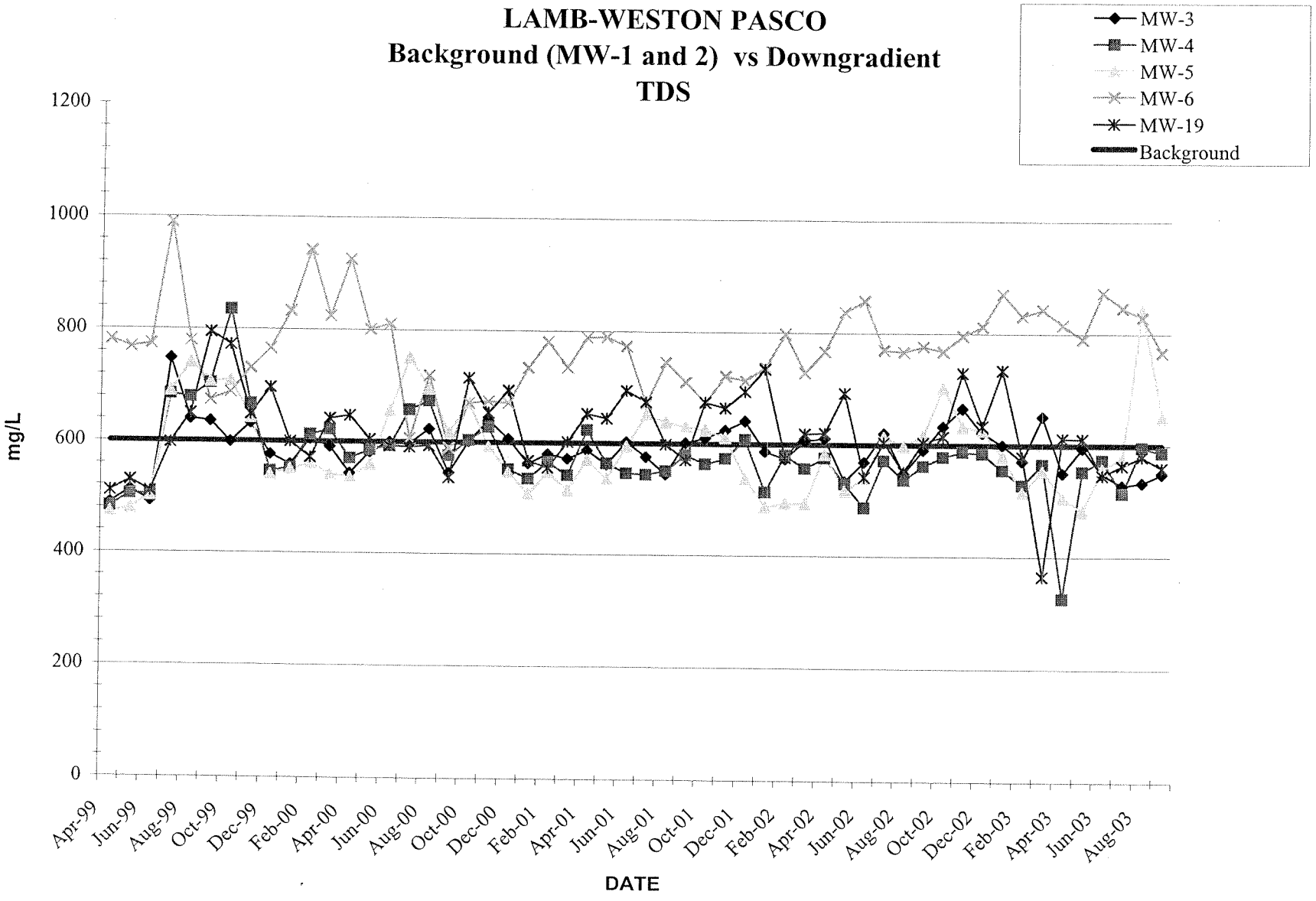

LAMB-WESTON PASCO
Background (MW-1 and 2) vs Downgradient
TDS
MW-3
MW-4
MW-5
MW-6
MW-19
Background
1200
1000
800
600
400
200
0
mg/L
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 12

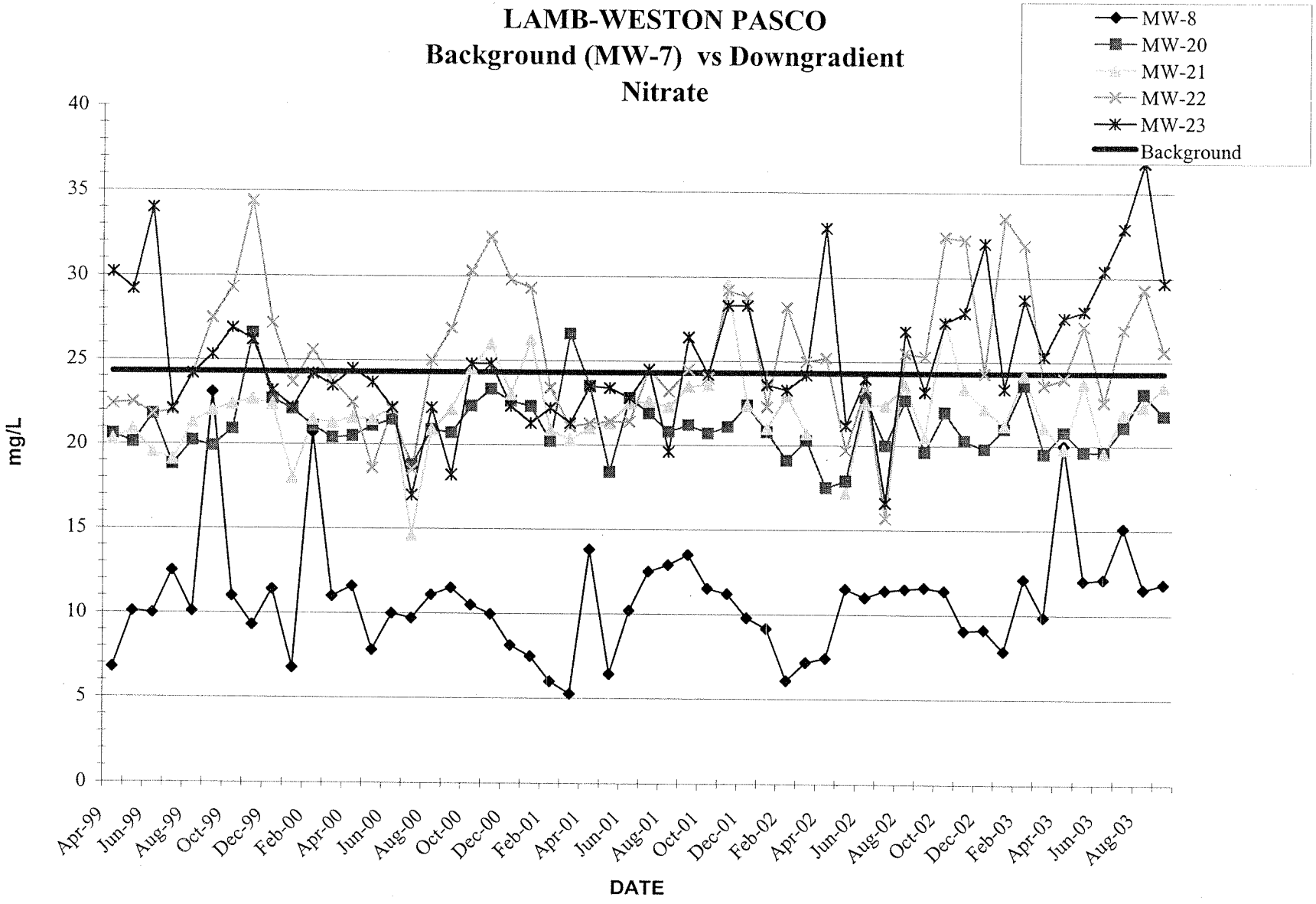

LAMB-WESTON PASCO
Background (MW-7) vs Downgradient
Nitrate
MW-8
MW-20
MW-21
MW-22
MW-23
Background
mg/L
40
35
30
25
20
15
10
5
0
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 13

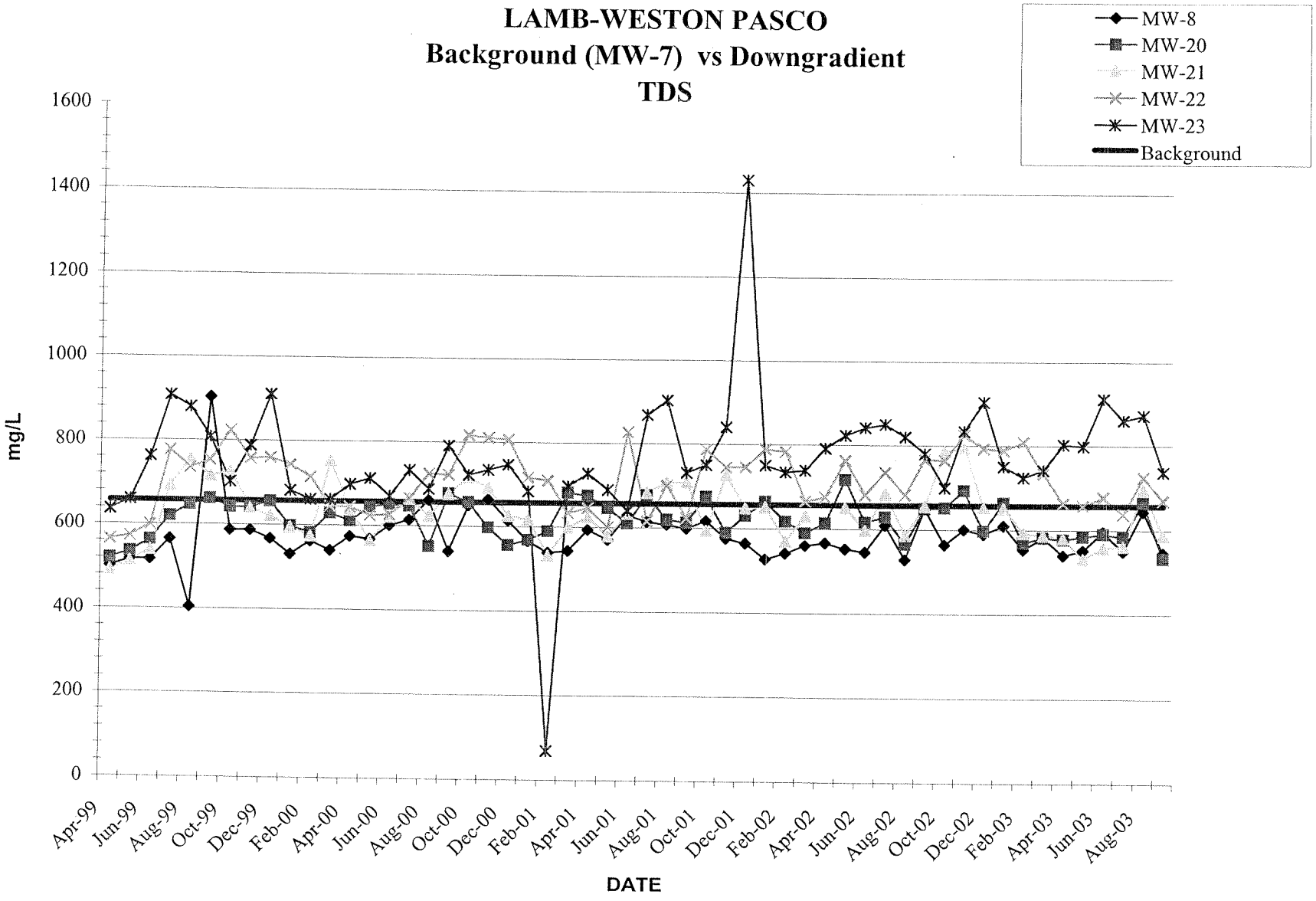

LAMB-WESTON PASCO
Background (MW-7) vs Downgradient
TDS
MW-8
MW-20
MW-21
MW-22
MW-23
Background
mg/L
1600
1400
1200
1000
800
600
400
200
0
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03
Jun-03
Aug-03
DATE

Fig. 14